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ABSTRACT

Project 30 is a national initiative of 30 representative institutions of higher education charged with redesigning teacher education programs. Objectives include implemention of reforms that will increase the competence and authority of teachers, provide for the substantive and imaginative development of the intellect of students, and strengthen the teaching profession. This report, based on a Project 30 national conference devoted to exploring implications of the five project themes or conversations is organized into three sections: (1) Education Program Reform in Method and Content; (2) Education Program Reform in Service; and (3) Limitations and Possibilities. Section 1 focuses on: initiation of dialogue between faculty from different disciplines and departments within the institution; team formation, for work on specific projects; and curriculum reform including creation of new courses, new majors, or new requirements in an attempt to improve their teacher education programs. Section 2 reports on collaboration between colleges and universities, and improvement of mathematics and science instruction (giving specific project description) and on efforts to integrate math and science instruction. Section 3 provides reports from several schools on problems encountered and the need for understanding real limitations, constraints, and politics of reform; and recommendations for the future. The final section is an epilogue entitled "Getting beyond the Reform Slogans." Information on the institutional characteristics of each of the Project 30 team members is provided. (LL)

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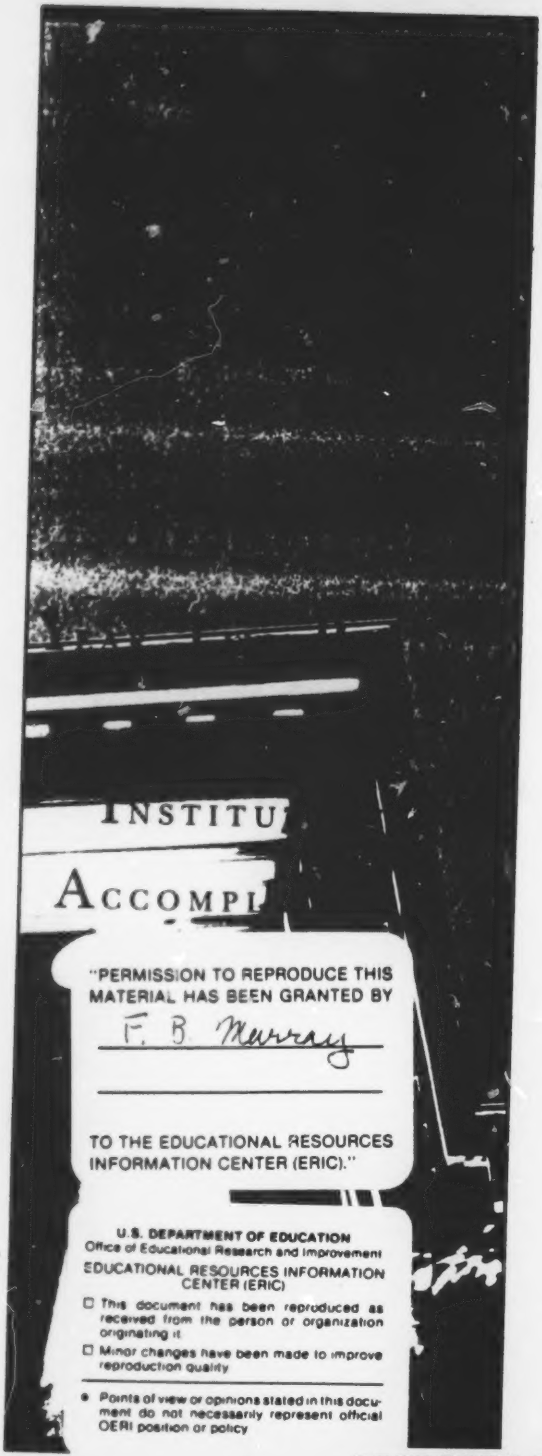

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PROJECT 30
YEAR TWO REPORT:
INSTITUTIONAL ACCOMPLISHMENTS

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Preface

For more than a century, during the enormous expansion of the United States education system, a recurring image of an ideal teacher gives testimony to a consistent aspiration. John Dewey expressed the goal clearly in 1904, calling for teachers to possess a firm foundation in fundamental disciplines of knowledge balanced with competent skill in the art of pedagogy. Periodic examination of the nation's schools, however, has repeatedly failed to find persuasive evidence of this ideal in actual practice. As a result, public confidence in schools and teachers has been equivocal.

With the publication of *A Nation at Risk* (1983) concern about the effectiveness of public education and the quality of its teachers was again brought into focus for the general public. The ensuing discourse, producing hundreds of articles and monographs, studies in all fifty states, and countless conferences, has confirmed that there is no simple solution. This intense period of analysis has, nonetheless, brought many individuals and groups into constructive dialogue about the quality of schools and teaching.

The myriad reports of recent years clearly and consistently indicate that teachers must be better prepared than ever before to address the complex tasks they face. It also is clear that the modern preparation of teachers requires much more than the efforts of any single university faculty. The task is beyond the faculties in schools of education, and all faculties in the university, especially the faculties of arts and sciences, must participate in the reform. The redesign of the teacher education curriculum must ground pedagogy in the arts and sciences and promote the study of discipline-based pedagogy throughout the academy. Further, joint efforts of cooperating faculties can demonstrate convincingly to the public that universities have accepted major responsibility for teacher education and thus for the quality of our schools.

Objective

Project 30 is a national initiative of 30 representative institutions of higher education to redesign the way that prospective teachers are educated at the nation's colleges and universities. What makes the project unusual is the full engagement of faculties of arts and sciences with faculties in education in joint action for fundamental reform.

Project 30 is designed to achieve better educated, better prepared teachers through collaborative curriculum redesign. In developing this project, we decided to avoid dependence on any formulaic curriculum model. There are many ways that the preparation of prospective teachers may be restructured with greater emphasis on the traditional arts and sciences. Rather than proceeding from a particular idea about curriculum, we chose to stress functional objectives.

The primary objective of Project 30 is to begin to implement a redesign of teacher education that will (a) increase the competence and authority of teachers, (b) provide for the substantive and imaginative development of the intellect of the nation's school pupils, and (c) strengthen the profession of teaching. We believe that a fuller integration of reformed liberal arts and education curricula will achieve the objective. How to strengthen foundations in the arts and sciences, and to improve articulation between those areas and pedagogical study, is best determined by each campus. By focusing on the functional objectives, each university faculty can design programs in their own settings that are likely to produce the targeted outcome.

Themes

Project 30 has identified five themes that are important to clarifying the intellectual underpinnings of teacher education and to the development of the teaching profession. These serve as the functional objectives that are the substance of the reform we advocate. The issues and problems embedded within the themes are well beyond the expertise of either the arts and science faculty or the education faculty to solve alone. Through joint consideration of these themes faculties can work productively toward effective and durable curriculum redesign. The five themes are:

1) *Subject matter understanding.* We agree that education programs for prospective teachers that are long on pedagogy but short on subject matter knowledge cannot properly prepare teachers to develop the intellectual resources of the nation's children. Teachers must be well-grounded in the academic areas they teach. However, students who earn good grades in their arts and sciences courses may still be unable to answer their pupil's questions with either the clarity or the integrity that the discipline requires. The typical course in the academic major may not yield the kind of understanding the prospective teacher needs to have. Therefore, courses and major programs in arts and sciences must be redesigned to insure greater conceptual subject matter understanding and more penetrating comprehension of the interrelationships among disciplines.

2) *General and liberal education.* Teachers ought to be respected as well-educated persons. Indeed, it is the teacher's command of general knowledge, and the teacher's display of quality of mind associated with liberal learning, that can effectively entitle the teacher to be called professional. The conversion of an activity from an occupation to a profession often requires that a large body of information and skills be acquired even though it cannot be shown that this acquisition enables the person to practice the profession better. The person's authority to practice rests on the demonstrated acquisition of these traits. In short, in order to behave like what the public expects from a professional, the teacher needs a broad store of basic knowledge and a lively mode of intellectual inquiry, even though the teacher may never specifically be charged with teaching these to anyone.

3) *Pedagogical content knowledge.* There is a kind of knowledge, indispensable to teaching, that is qualitatively different from the knowledge that is contained in

the subject matter disciplines, but cannot exist in the discipline of education without the prior study of an academic discipline. As an example, the teacher in the elementary school may teach subtraction with any of a half dozen algorithms that yield correct answers and make sense mathematically. How is the teacher to decide which algorithm to teach? The discipline of mathematics gives no guidance on this question, but the discipline of education can only be useful to the teacher who is well-grounded in this aspect of mathematics. Similarly, physics has nothing to say to the teacher about whether hydraulics is a good metaphor for electricity. The teacher cannot decide whether to use the metaphor without first consulting both the disciplines of education and physics. Pedagogical content knowledge is an amalgam forged of deep structural understanding of content and equally rich knowledge of pedagogy and its complexities. It is the basis upon which the teacher builds a "representational repertoire" of content. The repertoire is built through the invention of multiple metaphors and analogies that allow the content to be taught. Teaching, then, is the art of constructing a bridge between the content knowledge possessed by the teacher and the pre-existing implicit understanding brought to the situation by the learner. The representational repertoire consists of the conceptual knowledge to build many bridges and the developed judgement to select which ones to construct.

4) *International, cultural, and other human perspectives.* For all persons, but especially for prospective teachers, the college curriculum must be accurate with respect to recent scholarship on matters of race, gender, ethnicity and cultural perspective. One sure anchor for the study of cultural diversity is the core value of the academy, namely the pursuit of truth. The likelihood of success in this purusit, for truth yielding its secrets, increases significantly when multiple perspectives are brought to bear, and themselves scrutinized, in the search. As the global economy has become increasingly interdependent, the United States has made little progress in freeing itself from its historical sense of isolation from the rest of the world. Americans can participate effectively in the international arena by learning other languages and comprehending other cultures. To address this challenge forthrightly, prospective teachers should have primary knowledge of other nations, languages, and cultures.

5) *Increasing representation of under-represented groups in teaching.* The population of minority students in public schools has grown, and continues to grow, while the proportion of minority teachers continues to decline. If present trends continue, we will approach a crisis in which the proportion of minority teachers (about 5% in the year 2000) will differ so severely from the proportion of minority pupils (about 40% in the year 2000) that the effectiveness of education will be compromised for all students. The recruitment and retention of minority teachers is a topic that must be taken up by a wider group than the education faculty. Ways of attracting more minority teachers and retaining their services and views must be discovered and incorporated into teacher education programs. The profession

of teaching will also benefit from the recruitment of other under-represented groups. These include men, and talented students of all kinds.

Project strategies

Project 30's participating colleges and universities, whose reports comprise this anthology of our accomplishments to date, are a representative cross-section of all four-year institutions in the United States that prepare teachers for certification: they are large and small, public and private, urban and rural, and include many that enroll large numbers of minority students. Individual institutions are devising models and plans that work best in their own settings. The project's implementation strategy relies upon effective and imaginative faculty who have a record of success in their home institutions. Each campus is different and has its own strengths and internal dynamics that govern how well academic programs are delivered.

In selecting the faculty teams to participate in this project we focused on those faculty in arts and sciences and in education with established reputations as faculty leaders in educational policy. We sought persons who during their careers on campus have often served in curricular leadership roles and who have tangible records of success in advocating and delivering new courses and programs. Participating teams from each institution have been charged by the project with forging a new plan for learning, one that works in the special circumstances of their distinct academic environment. By emphasizing the role of local leaders and stressing functional outcomes we have tried to create powerful conditions for genuine change of lasting duration.

Two national conferences of the 30 participating schools have been held in addition to two meetings of the team leaders and two meetings of the National Advisory Committee. Initially the teams met at the Woodlands (Texas) in October 1988. This conference addressed the overall goals of Project 30, and, through a series of seminars, engaged the teams in extended exploration of the five themes. Within Project 30 these themes have come to be called "conversations," in recognition of the dialogue taking place between faculty in education and faculty in the arts and sciences. In one of the schools, the term, project 30, became a synonym for other collaborative projects between different faculties (as in, "Oh, that's a project 30 type thing").

During the first conference, teams also spent time formulating the acting plans they would be initiating on their home campuses. Six months after this conference each team submitted a written report on the status of its curriculum redesign. The distintive character of these innovations is summarized in our *Year One Report: The Reform of Teacher Education for the 21st Century*.

The second national conference was held in December 1989 in Monterey, California. Seminars, presentations, and plenary sessions were devoted to exploring implications of the five themes. Teams reported on their respective progress in curriculum redesign, as well as reflecting further on insights they had gained regarding the five themes. Summary reports of each team's initiatives and curriculum redesign efforts were submitted in July 1990. These reports are the basis of this anthology.

As the final phase of implementation for Project 30, a national organization has been formed, open to all who plan to work within and continue the Project 30 agenda. In addition to this anthology, the project co-directors are extending the themes of Project 30 in a book about the reform agenda and the need for national action.

The National Advisory Committee

At the outset of the project, a national advisory committee was established to review policy and oversee the coordination of the project. Stanley Katz, President of the American Council of Learned Societies, serves as chair. Other members of the committee include: John Goodlad, University of Washington's Director of the Center for Educational Renewal; Patricia Graham, Dean of Harvard University's Graduate School of Education; Barbara Hatton, Deputy Director of the Ford Foundation's Education and Culture Program; James Kelly, Jr., President of National Board for Professional Teaching Standards; Eugene Cota-Robles, Assistant Vice President of the University of California at Berkeley's Office of Academic Affairs; Lee Shulman, Professor of Education at Stanford University; Ron Wolk, President of Editorial Projects in Education; and Donald Stewart, President of The College Board. The presidents of CCAS and AACTE and the chair of ACAD serve in an ex-officio capacity on the Advisory Board.

Cooperating Organizations

From the beginning three professional organizations supported the idea for a collaborative project on the connections between the liberal arts and education.

The American Association of Colleges of Teacher Education (AACTE). The AACTE is a national, voluntary organization of colleges and universities that prepare the nation's teachers. Member institutions include small liberal arts colleges, state universities, and large research institutions. Combined, they graduate more than four-fifths of new school personnel each year.

American Conference of Academic Deans (ACAD). Affiliated with the Association of American Colleges, ACAD is a national organization composed of more than 350 academic administrators from some 275 four-year liberal arts institutions.

Council of Colleges of Arts and Sciences (CCAS). The CCAS is the national association of deans of colleges of arts and sciences. The CCAS serves as a forum for the exchange of ideas and information among deans of arts and sciences and as a representative of the liberal arts at a national policy-making level.

Finally, the generous support of Carnegie Corporation of New York enabled the project to go forward and eventually to become self-sustaining. Also the Johnson Foundation made its Wingspread Center available for a meeting of the team leaders for a review and analysis of the *Year One Report.*

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We express thanks to **Karl Henzy** of the University of Delaware, who read and studied each institution's report and edited and reworked each into the chapter organization and bridging text that follows. Our thanks also to Elaine Stotko, who oversaw publication of this Year Two Report, and to Allison G. Kaplan, who indexed the volume.

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Section One

EDUCATION PROGRAM REFORM IN METHOD AND CONTENT

INITIATING DIALOGUE

A number of Project 30 teams found that the first step in educational reform at their institutions was the initiation of dialogue between faculty from different disciplines and departments within the institution. This was done in a number of ways, from formally structured retreats and symposia, to simple, more informal gatherings.

Pembroke State University

Perhaps one of the most exciting and encouraging activities resulting from Pembroke State University's involvement in Project 30 was a retreat held in May 1990. The two-day retreat involved the chief academic officers of the university and faculty from the Departments of Education, Art, Psychology, American Indian Studies, Communicative Arts, History, Health, Physical Education and Recreation, and the Graduate Studies Office.

Initial reactions from faculty to the invitation to participate in the retreat were overwhelmingly positive. Those invited graciously agreed to give of their own time to attend (school was not in session). As time for the retreat grew closer several individuals expressed some skepticism about the retreat but agreed to honor their commitment to attend.

Away from phones and other distractions at a facility specifically designed to accommodate retreats, faculty and administrators engaged in lengthy, uninterrupted conversations on issues and topics of particular importance to the teacher education programs at Pembroke.

Before the retreat, participants received appropriate background reading materials. The evening they arrived at the center, a meeting to orient participants to the specific goals of the retreat was held. At this time, each participant received additional information to facilitate discussion. Time was provided for retreat participants to interact informally the first evening so that faculty and administrators would have a chance to become acquainted with one another outside of the university setting.

The next morning, several whole-group activities were utilized to further set the stage for discussion. Participants viewed a slide presentation on the demographics of the 21st century. Produced by a group of high school students and available through Phi Delta Kappa, the slides vividly portray what teachers face in the years to come. Participants were then asked to determine how they would present a particular lesson to a group of students. The information they were asked to teach was carefully selected to ensure that none of the participants would have presented it before so that the exercise would allow them to think about the teaching and learning process. The final whole-group activity asked participants to rank several candidates for a teaching position. Discussion of the rankings helped identify which characteristics of effective teachers the group perceived as important.

The remainder of the morning session was spent in small group discussions focusing on the characteristics of an effective teacher, the challenges facing teachers today, the skills, knowledge, concepts, and attitudes needed by teachers, and how Pembroke can best prepare future teachers.

The afternoon session began with reports to the entire group from each of the smaller morning discussion groups. The groups reached consensus on many ideas. Participants spent the greatest part of the afternoon in additional small group discussions. Each group was assigned different tasks and asked to prepare specific products to share with the entire group. These products included:

- specific suggestions to strengthen the professional education sequence;
- a draft of a revised mission statement for teacher education at Pembroke State University in line with the revised University Mission statement and reflecting the participants' conception of a teacher;
- specific suggestions for minority recruitment; and
- specific suggestions for program improvement based on feedback from surveys of graduates and their employers and the standardized test performance of students.

The following day, each of the small groups presented its ideas to the entire group for discussion and reaction. The numerous helpful strategies, suggestions, and ideas that were generated will be presented to the Teacher Education Committee when school resumes in the fall.

Was the retreat successful? Feedback from all participants was extremely positive and even those that initially had reservations have asked for follow-up sessions and meetings next year. Greater understanding across disciplines and strengthened bonds between education and liberal arts faculty are already apparent. The only regret is that the retreat was not held at the onset of the project.

In the fall, follow-up meetings will be conducted for retreat participants to further strengthen the bonds between education and liberal arts faculty and to pursue conversations begun at the retreat. Invitations to participate in these conversations will be extended to education and liberal arts faculty who did not participate in the retreat.

Indiana State University

Indiana State University found a number of ways for faculty from different schools and departments to communicate with one another. Under the leadership of one Project 30 team member, who chairs the Department of Secondary Education, methods teachers in the College of Arts and Sciences, the School of Business, the School of Education, the School of Health, Physical Education, and Recreation, and the School of Technology came together in the spring of 1989 for an all-day retreat to attempt to work through in a coherent way some of the issues related to methods teaching. A very different vehicle for bringing the arts and sciences and education faculties together to discuss common goals was a pair of wine and cheese gatherings held at one-year intervals at a private club off campus. The first was devoted to the exploration of Lee Shulman's notion of pedagogical content knowledge and the second to content-specific examples of effective pedagogical practice. The events drew fifty and thirty-five faculty, respectively, and provided an effective context for both the formal and informal sharing of ideas and the meeting of colleagues across school/college lines. For junior faculty in particular, the events allowed contacts to be formed that might otherwise not have taken place.

The team also sponsored two faculty symposia, held in a large meeting room in the School of Education. The first, devoted to "Engaging Students Actively in University Classrooms," featured speakers from the Department of History, the School of Education, and the School of Business and drew approximately 100 attendees in the spring of 1989. A year later, the second symposium drew a like-sized audience and featured faculty from the Department of Communications, the School of Education, and the School of Nursing addressing the same subject.

The value of the team members' meeting frequently with one another, various university groups, and certain administrators cannot be overstated. What had been occasional and often formal relationships among team members became, in the course of Project 30, regular, enjoyable confabs between close colleagues. Arts and sciences and education faculty and administrators weren't just meeting to plan events that would improve inter-unit relationships; they were improving those interrelationships through their very contact.

The deans of the two units, who, for the most part, did not play very direct roles in Project 30, had developed an excellent working relationship before the Project began. Project 30 allowed the associate deans who represented their units in Project 30 to develop a close working relationship as well. The value of that relationship, independent of events of the last several months, is considerable, but even greater value has been attached to the relationship since the Dean of the School of Education throughout the Project 30 period resigned to assume the Vice Presidency at the University of South Dakota, and the associate dean has succeeded him as Acting Dean. Project 30 has, in other words, ended up playing an important role in paving the way for what both units hope will be a continuing period of cooperation between Arts and Sciences and Education.

Millersville University

Millersville University's Forum Series, intended to explore the links between liberal arts and education, was a six-lecture series initiated in March of 1989 and continuing to April 1990. Topics were related to themes of teaching excellence and to the integration of liberal arts and education. The speakers were split equally among scholars whose primary training was in education and those whose training was in liberal arts. All the Forum Series speakers were persons who have themselves, in their lives and work, integrated liberal arts knowledge and background with educational careers and activities.

Forum Series programs included: Frank Murray, Dean of the College of Education at the University of Delaware, and Alan Tom, then Professor of Education at Washington University, discussing "Educational Reform and Teacher Preparation"; Albert Shanker, President of the American Federation of Teachers, discussing "Teaching as a Profession"; Florence Howe, former President of the Modern Language Association and publisher of The Feminist Press, discussing "The Role of the Teacher in Student's Lives and Learning"; Stephen Jay Gould, Alexander Agassiz Professor of Zoology, Harvard University, discussing "Boundaries: A Taxonomist Looks at Arts and Sciences"; Patricia Hill Collins, Associate Professor of Afro-American Studies at the University of Cincinnati, discussing "The Multi-Cultural Context of Teaching"; and Lee Shulman, Professor of Education, Stanford University, discussing "What Teachers Know/How Teachers Think."

Each lecture was set up to model the kind of cross-disciplinary conversation Millersville seeks to encourage. Each guest speaker was introduced by a member of the Millersville faculty who was not of his or her discipline. For example, Drs. Murray and Tom were introduced by Dr. Pat Hill, a member of the Millersville University Chemistry faculty. At the end of the featured discussion, Dr. Hill responded with comments and questions from her point of view, not as an education specialist but as a scientist.

The lecture series was generally well attended and successful in that the stature of the speakers lent credibility to Millersville's efforts, and in that it clearly demonstrated that issues related to teaching were of interest to arts and sciences scholars. It was also successful in that Millersville attempted to coordinate Forum Series events with other activities and other departments on campus. Al Shanker's and Lee Shulman's lectures were coordinated with the Anna Funk Lockey Lectureship in Education. Dr. Collins' lecture on the "Multi-Cultural Context of Teaching" was coordinated with Black History Month activities at Millersville. Florence Howe was accorded Scholar-in-Residence status and was sponsored jointly with the Department of English and the Commission on the Status of Women. Again, these were efforts to model appropriate interaction between education and arts and sciences faculty. However, while the Forum Series was successful in enabling virtually all faculty to "see themselves" in relation to issues to teaching, it does not seem that the lecture series actually changed the way faculty thought about teaching, nor did it encourage cross-cultural conversation. The follow-up "metaphor" discussions may have been more successful in achieving that goal.

During the week following each Forum Series lecture, faculty were invited to participate in small group discussions devoted to developing metaphors for the aspect of education or teacher education addressed in the lecture. These were one-hour discussions, and faculty were divided into groups of 8 to 10 for purposes of discussion. The number of faculty participating ranged from as few as eight after one lecture to as many as forty-five after another.

The six separate discussion assignments included developing metaphors to convey: (1) the relationship between general education, the academic major, and professional studies in a teacher's education; (2) the relative roles of the public school teacher and the college or university professor; (3) the good teacher's impact on the student; (4) the relationship between a field's modes of inquiry and its methods of teaching;(5) the differences in students' background and learning; and (6) the interaction of content and method in teaching.

An example of the kind of discussion that went on may help the reader to understand the value of these discussions in teasing out individual faculty members' assumptions about issues related to teaching and in focusing, as well, on the differences between education faculty and arts and sciences faculty in those assumptions. At one discussion, an education faculty member suggested that the relationship between general education, the academic major and professional education course work in a future teacher's education could be metaphorically described as a "hot air balloon." The basket, that in which you ride and which holds you up, is general education. The balloon itself is the academic major or subject matter. The hot air, the helium, which enables the balloon to rise is pedagogy or professional education. A scientist agreed that the metaphor might have value, but sharply disagreed about which parts of the balloon represented which parts of a teacher's education. She allowed that general education might be compared to the basket, but argued that pedagogy or professional education is the balloon, and the hot air which makes the balloon rise is the discipline, the academic major. While it may seem funny that arts and sciences and education faculty are arguing over which one of them is really the "hot air," it is important to note that this is precisely the issue that Lee Shulman (1990) and Jonas Soltis (1990) address in their recent reconsideration of the "foundations" of teacher education. The value of the metaphor discussions is that they allowed faculty to engage in important theoretical discussions without worrying about the appropriate academic jargon. The issues became clear metaphorically.

In general, the metaphor discussions seemed interesting and effective for faculty who participated. The difficulty was that not all faculty, or even as many as Millersville might have liked, participated.

There is some evidence that these kinds of discussions can go on effectively in much larger groups. Dr. Barbara Stengel had an opportunity to address a Pennsylvania State System Colloquium in the Spring of 1989 on the integration of liberal arts and professional education and used that opportunity to engage an audience of approximately 100 participants in a metaphor discussion. She gave the assignment, gave participants five minutes to think, and then asked them to share their thinking with a friend or neighbor. Subsequent discussion raged. Faculty in attendance at this colloquium became so involved in the task of talking about their metaphors that they continued their discussion with Dr. Stengel and with other participants long after the session was completed.

University of Texas at El Paso

The University of Texas at El Paso's Project 30 goals were to promote teacher education as a university-wide responsibility and to promote quality preparation programs. These goals grew out of some unfortunate faculty interactions that resulted from the passage of a state law reorganizing teacher education and from a historical lack of communication. A number of faculty retreats were held in which participants heard presentations on and discussed teacher education issues. Although the university's decision-making structure in teacher education was tangibly changed, the results of the project were in many ways more process than product.

The late 1980's was a time of dramatic and traumatic change in teacher education at the University of Texas at El Paso. In early 1987, the Texas legislature passed a bill that placed an 18-semester-hour cap on university professional preparation for teachers and mandated that would-be teachers major in an academic or interdisciplinary academic area. The necessity to comply with that legislation led to the initiation of dialogue between education faculty and arts and science faculties. Partially because of time constraints and partially because of lack of mutual understandings, those discussions focused on pragmatic concerns (which courses and which degrees) rather than authentic issues of program and quality preparation. The discussions lacked recognition of teacher preparation as a campus-wide activity, instead focusing on turf concerns.

University leadership saw Project 30 as an opportunity to extend and improve the quality of earlier discussions by shifting the focus to programmatic and quality concerns and promoting mutual understandings about the importance and need for wide participation in teacher preparation. Thus, the goal of U.T. El Paso's Project 30 was to stimulate authentic discussions about teacher education among faculty all across the institution as well as to build a consensus on the nature of quality teacher education. The Project sought to develop a genuine partnership across the Colleges of Education, Liberal Arts, and Sciences and the local schools.

The strategy selected by the Project Steering Committee was to broadly involve faculty and local practitioners in discussions of teacher preparation through well-designed faculty retreats. The first of these was held March 17, 1989, at a local hotel conference center. Participants in this retreat included numerous leaders of the university community, prominent administrators, and respected school practitioners. Dr. Gary Fenstermacher, Dean of Education (University of Arizona) and president of AACTE, opened the day-long retreat with a presentation on the status of teacher preparation in public universities; under that theme he addressed themes of subject matter knowledge, professional knowledge and pedagogical content knowledge. Participants then heard from local teachers, graduates of U.T. El Paso, who provided anecdotes critiquing the university's teacher preparation program. Finally, task groups were created, each charged with reflecting upon the information presented, examining the recently approved teacher preparation programs, and making recommendations for changes; these recommendations were presented to and discussed by the larger group. Participants reported significant increases in their understanding of teacher education and a significant desire to meet on a regular basis to consider and discuss issues and developments in teacher preparation. The group also called for establishing some type of cross-collegiate governance group that could continue the dialogue and try to assert institution-wide leadership in teacher education.

In November of 1989, a second retreat was held. A keynote address was given by the university President, who focused on the need for interdisciplinary study for teachers in arts and sciences courses. This also provided the opportunity for the newly appointed dean of Liberal Arts to convey his commitment to broad institutional responsibility for teacher education. In this retreat, task groups focused on specific topics (e.g., pedagogical content knowledge) in order to make specific recommendations.

Although the steering committee intended initially to follow up with action groups to flesh out specific curricular initiatives, it decided to be somewhat less aggressive and concentrate more on continuing to promote institutional dialogue on teacher education (i.e., open communication) and broad consideration (and perhaps consensus) on quality aspects of teacher preparation. Thus, the university plans to continue faculty retreats, at least annually, where participants will have an opportunity to consider and discuss novel and stimulating ideas on quality teacher practices and the preparation of teachers to demonstrate such practices.

The results of U.T. El Paso's Project 30 are in many ways more process than product. Unlike the atmosphere prior to Project 30 activities and planning, university faculty and local school practitioners were able to sit together, discuss points of view calmly, and get excited about common ideas. While programmatic changes were not realized (it was decided that stability after wide changes was healthy in the short run), Project 30 activities have helped build the infrastructure for future developments—quality focused ideas, positive professional relationships across disparate disciplines, a desire for learning more about teacher education, and the acceptance of teacher preparation as a university-wide responsibility.

One very observable product was the establishment of the Teacher Education Council as a new element in the university's decision-making structure. This group, representing the entire university and the practicing profession, considers all teacher education initiatives and proactively advocates positive practices in teacher preparation. It seems clear that the project goal of establishing teacher education as an institution-wide mission has occurred. The ongoing task of Project 30 is to maintain that commitment. With resources at both the collegiate and institutional level pledged to do this, Project 30 will live on.

If the planning erred in any direction, it was in assuming that group processing in retreats could quickly come to concrete initiatives. The process was much slower than expected, but as the steering committee came to believe, an atmosphere of collegiality and consensus will lead to better quality decisions and developments later. The level of fatigue of the faculty, especially education faculty, after the long, tough curricular discussions held earlier, had been misread and became an important factor as events proceeded; a strong, energetic education faculty is vital to any major shifts in teacher education, and the retreat process went a long way toward breathing new life into that group.

University of North Carolina at Chapel Hill

Project 30 has provided faculty and administrators at University of North Carolina at Chapel Hill with important opportunities to improve the university's capacity to educate future teachers—by educating themselves about the special skills and sensibilities our nation's increasingly multicultural classrooms require.

At a two-day workshop in May 1988, a group of faculty from several Arts and Sciences departments and the School of Education discovered, among other things, that

- *Changing curricula and course content will not be enough.*
  Faculty and students usually get tense when race and gender stereotyping are discussed in class. To address these issues effectively, most faculty will need, first, to receive guidance in self-discovery. Faculty must learn how their own stereotypes developed, and how they operate in classrooms today—for they do operate insidiously there, despite the widespread assumption that "we" have gotten beyond such limitations.

- *Learning about ourselves in this way can effectively begin by discovering how the classroom affects non-majority students in our own individual institutions.*
  At Chapel Hill, this beginning has been achieved through strikingly informative interviews the Office of Institutional Research undertook with successful minority students. To read the transcripts of these interviews is to awaken, in surprise, to ways in which details of language, presentation, and non-verbal cues can seem racist to non-majority students.

- *This beginning is best followed by a workshop, directed by a counselor who specializes in the cognitive development and functions of racism and sexism, in which faculty explore their own conditioning and classroom experiences with an interdisciplinary and interracial group of peers.*
  This process has allowed an energetic and diverse group of UNC-Chapel Hill faculty to get to know the problem, and each other, unusually well. The degree of camaraderie and commitment developed at this workshop began automatically to produce energy and ideas for follow-up activities.

Those follow-up activities include:

- *Initiatives to educate the institution's top administrators, as well as other faculty, about the complexity and importance of the problems and opportunities multicultural classrooms present.*
  These efforts include the writing and dissemination of grant proposals and other plans that will broaden opportunities for faculty to benefit from multicultural workshops.

- *The provision of increasing numbers of course-development and course-modification grants designed to foster specific projects that the multiculturalism workshops generate.*
  Several workshop participants who teach courses that enroll large numbers of freshman have already received such grants through Dean Gillian Cell's office; Dean Cell expects to be able to provide still more such funding.

- *The development, by means of such grants, of "foundation courses," courses available to freshmen that will address issues of racism, sexism, and related "isms." These courses will enroll (through special advising arrangements) significant numbers of non-majority students, and students (e.g., the North Carolina Teaching Fellows) who plan to earn degrees in education.*
  This project will be a top priority in this January's workshop for faculty who participated last May. Among other topics—suggested by the participants—will be broader efforts (1) to modify the undergraduate curriculum, (2) to mount efforts to hire more non-majority faculty, (3) to study the influence of the SAT and GRE examination on admissions of non-majority students, (4) to develop a continuous process of faculty-student interviews that will (among other assessment aims) evaluate the University's capacity to educate racially and ethnically diverse groups of students.

Since teacher education students at UNC-Chapel Hill spend their first two years in General College, a strong foundation for understanding cultural diversity was considered important by the Teacher Education faculty. It is believed that by developing such a foundation at the General College level, the professional education courses for teachers at the upper-division levels (junior and senior years) could be radically transformed. In addition, Project 30 enabled faculty from Teacher Education as well as from Arts and Sciences to engage in sharing concerns and ideas related not only to the mainline courses in general education but also to courses and experiences in Teacher Education. It is believed that such interactions by faculty from across the campus are critical if Teacher Education is to be a prominent part of the university community. Project 30, along with other efforts such as Teacher Education Through Partnership, has enhanced this goal.

TEAM FORMATION

Once dialogue concerning teacher education reform has been initiated, a possible next step is the formation of teams for work on projects. Teams can be formed of faculty from different departments or schools and can even include teachers from area elementary and secondary schools. Whatever the personnel, teams can draw on the experience and abilities of their different members, and the result can be a real capacity for educational reform.

Texas A&M University

The pairing of professors in the arts and sciences with professors in education was the goal of Texas A&M's project. Initial conversations and an informational breakfast meeting, as well as less formal follow-up meetings led the Project 30 team to discover an interesting phenomenon. Although the faculty were concerned about the need for vital links between arts and sciences and education faculty, and interest in the same was heightened, links were not forthcoming. The Colleges of Liberal Arts, Science, Geosciences, and Education had been created as separate entities from a single structure about twenty-five years ago. With the growth from 10,000 to 40,000 students and the corresponding desire to develop a faculty with significant research activity, Texas A&M had reached a point where its faculty was infused with many younger faculty members, the vast majority of whom have been concerned with developing or enhancing their scholarly reputations and quite naturally are in that mode of operation. Thus, the time-consuming process of developing partnerships with faculty in other colleges was one that was not generally begun unless there was common scholarly ground.

The difficulty of convincing faculty to form links with professors from other disciplines led the Texas A&M team to alter its stance to one of nurturing partnerships that had already formed or were forming. This required some careful listening and following up when the team encountered ideas, problems, or projects connected with the teacher education issue.

The team discovered that a key to these partnerships is a central core of committed faculty from each discipline who can work together to share information gleaned from conversations in their home departments. The sharing of information leads to recognition of pairings that can then be suggested along the lines of,"Professor X in the Department of Y is interested in a very similar issue. I'll get the phone number for you and......" Once a partnership is formed, the professors involved must be made aware of any institutional support system for such efforts. Clearly the commitment of the institution is key for further progress.

As a result of the process mentioned above, four pairings were initiated. Two ended early when partners took positions at other universities. The other two occurred later in the project time frame and are ongoing. Although Texas A&M was discouraged at the small number of pairings, they also realized that if one or two pairings could produce significant results, then they could serve as examples to other faculty members of what can be accomplished.

In particular, Texas A&M found that the formation of faculty teams from different schools within the university is an effective way of addressing the problems of science and mathematics education in Texas. They realized that any enhancement in these areas must deal with shortages of qualified teachers, low salaries, and outflow from the teaching ranks. In general, Texas A&M's faculties are aware of these issues and understand that their main impact can be in affecting the qualifications of the teachers. Thus, the main collaborations that are now forming address this issue.

One Texas A&M Project 30 effort addressing this concern was a collaboration of Dr. Peter McIntyre, Professor of Physics, and Drs. Donna Wiseman and Carol Stuessy, Professors of Educational Curriculum and Instruction. The project has involved a radical overhaul of the course sequence in physics taken by students intending to teach elementary school science.

The climate for interaction developed when Dr. McIntyre discussed with Dr. Wiseman the course topics and expected student enrollment. The course (Physics 350) had been on the books for some time but the recent events in Texas brought it to the foreground. During the discussion it became evident that there was a potential for the College of Education and the Physics Department to interact in the course development and presentation. At the same time, it was known that Dr. Stuessy, a science educator, was joining the faculty of the College of Education in the fall of 1989. Project 30 at Texas A&M provided funding for some aspects of the collaboration among Drs. McIntyre, Stuessy, and Wiseman.

Of the preservice teachers enrolled in the fall semester of Physics 350, ten were chosen to participate concurrently in a seminar designed to monitor their learning and understanding of physics and physics instruction. The methodologies for this seminar were developed by Drs. Stuessy and Wiseman. Dr. McIntyre also met with the students in small group situations to discuss educational philosophy and instructional techniques. The development of the seminar was carried out with an eye to an adaptation of the traditional methodology and instructional techniques to enhance the learning of the preservice teachers in the course. The feedback gained from the students was valuable to the instructors in adapting the course for spring semester students.

The revised curriculum integrated a group of experiments that apply directly to the topical content being discussed. Experiments involving lasers and experiments about superconductivity are readily accessible and relate to topics of current interest and indeed everyday use (lasers and automatic grocery checkout, superconductivity and the SSC). One early recognition was that an experimentally based curriculum must be chosen carefully to avoid superficiality. Therefore, the quantification of results and observations is critical in preparation to teach in a society that is evolving ever more to a highly technological state. In developing the analytical skills necessary to the quantification abilities of the students, a perhaps foreseeable difficulty arose: the mathematical preparation of the students was generally poor. Mathematics is an aid in understanding physics, but only if one knows mathematics. Purely descriptive physics is difficult to understand because basic principles are not always easy to define from unsophisticated experiments. A teacher can help his or her students understand only if he or she has a good knowledge of underlying principles. Without mathematical ability or background, the teacher candidate will have great difficulty in understanding physics. Thus, the team is seeking a future collaboration to involve a faculty member of mathematics to solve the problem of underpreparation.

The future of team formations among faculties of arts and sciences and education is a positive one. The faculties are now more aware of the need for collaboration, especially in the arena of preparation of elementary school teachers.

Millersville University

At Millersville University, faculty members from the arts and sciences collaborated with education faculty to create "pedagogy seminars" for teacher education students. The pedagogy seminar constitutes an exploration of a single question: how does the successful teacher transform expertise in subject matter into a form that students can comprehend? This ability, which has recently been characterized as "pedagogical content knowledge" (Shulman, 1986, 1987), is central to the educational process.

Teacher education students require opportunities to think about course content in this way, that is, to integrate content and method for teaching. The pedagogy seminar is structured to make this possible. Pedagogy seminars are one-credit seminars which accompany regular three- or four-credit arts and sciences courses. These optional seminars are team-taught by the arts and sciences faculty member, who offers the primary course, and a teacher education faculty member.

The purpose of the pedagogy seminar is to identify and analyze the teaching techniques employed by the primary course instructor and to encourage students to reflect on the process of their own learning, so that students will themselves be able to take course content and transform or translate it for another audience. Therefore, the focus of the seminar is the primary course content as it is taught and learned, rather than generic principles of pedagogy. In essence, the primary course to which the seminar is attached becomes a "case study" in pedagogical content knowledge, and the instructional team leads the seminar participants through the case. In the process, students not only analyze the teaching techniques employed by the primary course instructor, but also construct and create alternatives for teaching the same material to other audiences.

Pedagogy seminars are limited to 16 students so that they can truly be conducted as seminars, relying heavily on group interaction and discussion. These seminars are open to any students but are designed to attract teacher education students. Registration is strictly voluntary.

The pedagogy seminar concept was approved by the Project 30 team in the Spring of 1989 and five seminars were offered on an experimental basis in Fall 1989. The seminars accompanied courses in Transformational Grammar, the American Presidency, Introduction to Statistics, Nutrition, and Introduction to Psychology. Six additional pedagogy seminars, accompanying courses in Introduction to Philosophy, Introduction to Film Studies, Origins and Evolution of the Earth, Introduction to Chemistry, The Sociology of the Family, and The Language of Music, were offered during Spring 1990. Grants from the Pennsylvania Academy for the Advancement of Teaching and the State System of Higher Education Faculty Development Committee enabled the university to implement the seminars.

Both faculty participants and students were enthusiastic about their participation in the seminar and the value of the seminars in developing future teachers and allowing faculty to communicate one with the other over issues related to teaching.

Student surveys reveal that over 90 percent of the students feel that they will be able to use what they are learning in the pedagogy seminar in their teaching careers and would recommend pedagogy seminars to other teacher education students. The students' required journals demonstrate, in a substantive way, what they have learned about pedagogical content knowledge in that particular discipline. Faculty are being encouraged to use student journals and their own experiences as data in scholarly articles about the pedagogy seminars.

All of the faculty who participated have been interviewed extensively about the nature and value of their experience. Dr. Katherine Green, a psychology faculty member, summed up, without prompting, Millersville's goals for the pedagogy seminars. When asked, "Would you characterize the seminar as successful or unsuccessful?" she replied:

> In terms of me personally, it was successful on a number of levels. It was successful in that I began to think about education, which I had never thought about before. I began to have a closer relationship with a person (involved in teacher education), which was a change.
>
> *It was the first time I thought about issues in pedagogy* and honestly, as much training as I have had in observation, training in self-observation and therapy, I never thought, in teaching, about why I did what I did. So I found myself constantly thinking, why are you putting that on the board? There are all these other things to put on the board, why did you choose that to put that on the board? It was really quite amazing. The seminar was very satisfying on that level. It was successful, I think, for Perry Love, my mentor, in that he would sometimes take notes on psychology just because he was interested in the topic and had not been exposed to it for awhile. He learned some more psychology, which is always a blessing. I think he enjoyed working with me. *We enjoyed working with each other*, which was really positive.

> I actually think the students got a lot out of it, because they commented on things like: "I've never had a chance to see professors in this light before, where we just sat and talked about things, and that we could come up with questions and considerations. You would prompt us, but we could come up with our own ideas, and you would take us seriously and begin to talk about it." I think that very informal way of discussing things and getting them *thinking about their own careers in teaching, and seeing us as human and struggling about how to teach and communicate* and how to be effective, is really important.

In this lengthy quotation, Dr. Green targets the areas of effectiveness in the pedagogy seminar that other faculty echoed and that were Millersville's goals for the seminar program. The seminars serve to allow teacher education students to think about content from the point of view of a teacher. They provide a cross-cultural conversation between arts and sciences and education faculty about issues related to teaching, establishing bonds that allow faculty to work together in teacher preparation across departmental lines. The pedagogy seminars also seem to serve as individual faculty development devices, enabling individuals to reflect on and, sometimes, to alter their own teaching practices. In general, the pedagogy seminars appear to be contributing to the generation of a university context and culture that values excellence in teaching.

Because of the apparent success and simplicity of the pedagogy seminar as a curricular reform, Millersville has pursued its implementation as a formal part of the Millersville University curriculum. It has been approved by the appropriate curriculum committees and by the University Faculty Senate and is "on the books." Millersville continues to seek additional external funding to run the pedagogy seminar program on an expanded, yet still experimental, basis. They wish to do so in order to determine not whether the pedagogy seminars are of value, but how, how many, in what disciplines, and with what courses, pedagogy seminars might be required for teacher education students. This involves thinking, as well, about the relationship of pedagogy seminars to present teacher education course requirements, especially methods courses. In addition, continuing the pedagogy seminars will also extend wide-ranging cross-campus discussion about the nature and structure of the very best teacher education program that can be provided at Millersville University.

All of these lessons have been incorporated into the development of a pedagogy seminar advisory committee created by the Faculty Senate. The advisory committee consists of one member from each academic division and serves in an advisory capacity to the pedagogy seminar coordinator, who has responsibility for presenting the proposed pedagogy seminar offerings to the Educational Foundations Department for approval. Broad-based participation in the determination of those who will participate in the pedagogy seminar program is one more example of cross-cultural conversation. For Millersville, the concrete legacy of Project 30 is their pedagogy seminar.

State University of New York at Buffalo

The State University of New York at Buffalo used collaboration among faculty, graduate students and undergraduate students, in a team-teaching effort in large courses, as a means of examining pedagogical content knowledge issues. These courses, with enrollments of 100 to 300 students, are taught in a lecture/recitation format. The lectures are given by a professor. The recitations are taught by graduate assistants with the help of undergraduate assistants. The team meets weekly to critique the previous week's instructional strategies and pedagogical decisions and to plan for the following week.

This model had been utilized for several years prior to the initiation of Project 30 in an evolutionary biology course taught by Dr. Clyde Herreid, a Distinguished Teaching Professor in Biology. With the advent of Project 30 at UB, the activity was expanded and enhanced in three ways: (1) the model was replicated in a world civilizations course, (2) education faculty became involved in the weekly pedagogical seminars, and (3) the potential value of the model for teacher preparation was explicitly recognized.

The world civilizations effort, directed by Dr. Orville Murphy of the History Department, grew directly from Project 30. Discussions in the Project 30 committee had underscored the need for preparing secondary school teachers to teach New York State's new global studies curriculum. Professor Murphy, the coordinator for UB's new undergraduate course in world civilizations and a strong believer in the apprenticeship method of training teachers, saw in the Herreid model an opportunity to use the world civilizations course as a vehicle for preparing global studies teachers in both content and pedagogy. He also shared with Professor Herreid the belief that the undergraduate assistant format could generate interest among students in teaching as a profession.

The responsibilities of the undergraduate assistants are to attend the course lectures; help in constructing, monitoring and grading examinations; help plan recitation classes; and provide feedback on the quality and effectiveness of the instruction. The insights of the undergraduate assistants (How is the course going? Was a particular topic too difficult? Were the recitations effective?) have proved to be particularly valuable. In the words of a graduate assistant:

> As for the undergraduate TAs, their contributions were also considerable. Their intimate understanding of the needs, attitudes, and weaknesses of today's students provided valuable feedback and insights into experimental approaches to learning and instruction attempted by the graduate TAs, which succeeded or failed, and why. The interest and efforts they put into the monthly quizzes resulted in fair and challenging test material that forced the students to keep up with the assigned reading and helped them to recognize its significance. The quiz questions they produced were also original. They, therefore, demanded an honest effort from every student

> because their input prevented anyone from resorting to standard multiple choice and true/false questions that, unfortunately, circulate within the student community. Last but not least, the team teaching/learning concept promoted a running dialogue that enabled all of us to view the tasks at hand from a number of perspectives. This enabled us to come up with answers to problems that if tackled individually would invariably have lacked the same degree of insight and thoughtful consideration that they received. We are certain that more improvements can be made, but we are equally certain that we are already on the right track.

Similarly, the experience proved valuable for the undergraduate assistants, one of whom reported:

> Initially, my first response [to the question of what was learned] would be that I have learned a great deal about how to give and grade quizzes. Granted, this is important to know, but when pressed I begin to see that there has been so much more that I will continue to draw on in the years to come. Primarily, this includes a lot of experience with which I can now decide whether I actually wish to pursue a career in teaching. Secondly, assuming that I do decide to, the course has given me a wide range of experiences that will be invaluable in solving problems that will arise with students. These experiences have come not only from working "behind the scenes" myself, but from watching others . . . who have experiences to share. I have no doubt in my mind that I will draw on what I have gained from my experience in World Civilizations in the future, probably in ways that I do not suspect now.

The role of the education faculty in the weekly pedagogical seminars was two-fold: (1) to analyze and document the experiment and (2) to bring into the discussions the perspectives of educational research and practice. Dr. Hugh Petrie, Dean of the Graduate School of Education, participated in the evolutionary biology seminar. Dr. Catherine Cornbleth, Director of UB's Buffalo Research Institute on Education for Teaching, participated in the world civilizations seminar.

A written record kept of the weekly seminar provides an important resource for future planning. With it, faculty can anticipate topics that cause students trouble, file for future use solutions that seem to work, and flag pedagogical problems that have not yet been solved.

Weber State University

At Weber State University a pilot project in Cooperative Student Teaching will be implemented during fall and winter quarters of 1990-91. Under the project, faculty from the English Department and the Teacher Education Department will work with student teachers. The weekly cooperative sessions will replace the traditional how-to-teach classes that have been offered by the English Department. This project integrates theory with practice in a school setting for the professional training of secondary school English teachers. The project is aimed to produce a more self-reflective, flexible graduate, rather than one merely socialized to the norms of a single supervising teacher.

California State University at Los Angeles

Prior to the implementation of the Project 30 proposal, there was evidence of collaboration among the schools at California State University at Los Angeles. Partially as a result of the chancellor's office directive establishing the all-university responsibility for teacher education, efforts involving faculty from the schools were in place. One example of this is the team-teaching project involving Dr. Ken Wagner, a professor of political science and Dr. Dennis Heim, a professor of curriculum and instruction. A section of the introductory political science course was designated for persons interested in pursuing a teaching credential.

Dr. Wagner, a strong supporter of teacher education, emphasizes the relevance of content related to teaching K-12 students. Dr. Heim, an expert in pedagogy, places special emphasis on pedagogy and relates it to actual classroom techniques. These same two faculty members also team-teach the course in social science methodology. This often occurs some two to four years after the completion of the introductory political science course. Therefore, while Dr. Heim concentrates on pedagogy, Dr. Wagner is available to review content and assist with information relative to pedagogy.

For CSLA, the opportunity to become a Project 30 school was seen as a means to institutionalize, beyond the committees and the chancellor's office mandates, the kind of collaboration already being practiced by Drs. Heim and Wagner.

San Diego State University

Through 1988-1990, San Diego State University continued a major effort, begun earlier, to engage more faculty members, in different disciplines and departments, in meaningful and sustained dialogue examining the extent to which their curricula were appropriate to the content of their disciplines. The goal was to build better bridges through collaboration in a series of seminars using faculty already collaborating in previous projects. These faculty members in education and arts and science had already devoted 1987 to planning the undergraduate curriculum strand that would integrate pedagogical content knowledge into discipline-based courses.

Collaboration was essential to this project and prerequisite to the planning. These formerly uninvolved individuals were introduced to the concept of pedagogical content knowledge (PCK); developed and expanded their own understanding of the concept; formed triads comprising a teacher educator, a content specialist, and a public school teacher; and then practiced teaching their understandings to each other. The triads became true teams with élan, cohesion, and a commitment to faculty members and students, asking the kinds of questions teachers of disciplines ought to ask. The triads piloted and evaluated three bridge courses in 1988-1989 and offered them again in 1989-1990. The collaboration of the 1987 planning year continued in regular seminars between the triads.

Melding the undergraduate course with the four existing seminars—in Biology, English, History, and Mathematics—at Crawford High School in San Diego was also accomplished. Since 1986 the collaborative emphasis in these seminars had been on implementing a PCK-based curriculum that included social and philosophical and psychological foundations, instructional design and methodology, and structured practicum. Triads for these seminars also met with members of the subject matter departments who served as master teachers for the credentialing students during their spring student teaching.

These meetings provided forums for familiarizing additional faculty members with the pilot and for giving them opportunities to consider the implications of the pilot for their own teaching. During the year the Crawford pilot faculty met with colleagues from other credential program blocks to discuss the pilot, what they were learning from it, and what implications there might be for broader program change. Triad members also met with academic discipline department colleagues to discuss the pilot and their impressions of the subject matter understandings that credential students were demonstrating.

Additional faculty and public school teachers were included in this planning, and three workshops were held to introduce these new participants to the underlying conceptual framework of the project. There was also an all-day seminar in November at which Crawford and bridge course triads met to discuss emerging critical points of articulation and continuity between the curriculum of the subject matter major and the credential program curriculum. There was a two-day workshop in January 1989 with approximately fifty participants. This workshop included not only the members of the two triad groups (Crawford and bridge course) but also other academic department faculty and administrators, teacher educators from both the single subject and multiple subject credential programs, elementary and secondary school teachers, and school and university faculty who work on the New Teacher Retention Project and other induction year programs in the College of Education. There was a third orienting workshop in June 1989 whose participants included, besides those from the previous workshops, first-year teachers, new faculty—new either to the university or to the groups, that is, from the academic discipline departments—and new public school teachers.

All these discussions, seminars, and workshops focused on the following questions as central to San Diego State's collaboration: (1) What has been the impact of the project on the participants' teaching practices? (2) What impact is the project having on the participants' colleagues outside of the project? (3) What were the participants' perceptions of the specific strategies that have been used in the project, that is, workshops, guest speakers, demonstration lessons? (4) What are the critical elements in establishing the triads or interdisciplinary teams? (5) Are the participants persuaded that they are developing courses that successfully incorporate pedagogical content knowledge strategies? SDSU's undergraduate bridge courses have also refined the assessment of future teachers. An integral part of these courses was the use of journals, concept mapping, and textbook evaluations to assess students' grasp of the disciplinary structure and the pedagogy necessary to teach that structure, or portions thereof, to different student audiences. Success here stimulated participants to advocate the use of a PCK-based course as a screening or assessment device for academic discipline departments to use for students wishing to enter the credentialing program. Discipline-based collaboration has so bridged the unbridgeable that at SDSU it is now possible and even probable in some disciplines to find academic faculty members willing to teach in education's credential programs and to teach one of their department's upper division courses in a team with a teacher educator and a public school teacher. It was love of discipline that brought them together and proved to be the common denominator, but during the collaborative process concern for pedagogy captured them.

University of Northern Colorado

The University of Northern Colorado created the Teachers for the Future Project. Seven Faculty Analysis Teams were established to develop analyses and recommendations in regard to an overall curriculum redesign. Each Faculty Analysis Team had seven faculty members from across the campus. The teams held hearings (four nights, five hours each) and then held a week-long retreat during which participants developed a set of overarching principles and recommendations. This set of recommendations came forward as a proposed framework for the overall goals, philosophy and direction for the redesign of the individual courses and teacher education programs at UNC.

As can be seen from Figure 1, the framework was simple and yet at the same time subtle and complex. It is basically one that organizes the curriculum of teacher education into four major components:

- The Learning Core (previously known as general education at UNC)
- Content Knowledge
- Pedagogical Knowledge
- Pedagogical Content Knowledge (based upon the influences of Shulman's work). The columns are organized around preschool to fifth grade teacher education, middle school and secondary teacher education programs.

Organizing Framework for Teacher Education at the University of Northern Colorado

		Teacher Education Programs		
		Pre - 4	5 - 8	9 - 12
COMPONENTS	Content Knowledge			
	Pedagogical Understanding			
	Pedagogical Content Knowledge			
	Learning Core			

Figure 1

There are several subtleties about this framework that are worth pointing out. One was the assumption that there would be Faculty Analysis Teams who had expertise and primary interests in one particular row or column of the matrix. A second key assumption was that the dynamic interactions would take place at the intersections of the rows and columns. The Steering Committee assumed that the Faculty Analysis Teams would be able to articulate the knowledge base, i.e. a set of assumptions, themes, key concepts and aspirations that would represent a particular row or column. However, to develop a teacher education program, the rows and columns would have to negotiate out differences by setting consensus and expectations for how each student would be constructing knowledge.

This is indeed what occurred during the FAT Retreat week. The Faculty Analysis Teams went through a process of articulating the knowledge base for their row or column and also went through a series of negotiations with other FAT's to determine where there were agreements and unmet needs and to develop consensus.

Two other stresses that helped stimulate discussion and analysis of programs are inherent in this framework . One has to do with the fact that there are four knowledge components identified in the rows of the matrix. The preexisting structure of programs at UNC was based upon the distribution of semester credit hours across three components: general education, subject major, and professional education. By having four rows of knowledge components, it was necessary to fracture the existing three-part paradigm. In other words, the turf battles became more complex because it was not clear where PCK fit or what it represented in terms of courses and student credit hour production. This became the wedge that opened up the possibility of examining all courses and components. A key to this was the overall perspective presented by the Steering

Committee that participants needed to look at what, in theory, Northern Colorado should do rather than carve up turf in the early phases of the FAT process.

Another point of stress that the framework offered at UNC was to break out middle school teacher education from elementary teacher education. In the FAT work, a further breakout emerged, distinguishing early pre-school and elementary teacher education. The middle school education shift was one that was underway within the state and nationally. The early childhood education shift was in the process of being sorted out within the state and nationally. In summary, proposing three program levels in the organizing framework became another wedge to help break up the older ways of thinking. These wedges also represent areas where there were no pat or fixed answers in place at UNC.

This overarching framework provided the structure for establishing Faculty Analysis Teams and a general focus for a campus-wide discussion. This framework and the FAT process has resulted in a series of recommendations for the overall structure of curriculum at UNC. The next step will be to analyze individual courses and programs and to develop proposals for new approaches that will then go through the standard curriculum review and approval process.

The framework provided a structure that was sufficiently loose and yet focused enough to maintain that careful balance between prescription and intolerable ambiguity. By basing this structure heavily upon the work of Lee Shulman and having Dr. Shulman make a very forceful presentation during the information phase, the need to address the knowledge components of the matrix systematically was made obvious. The criticism of schools and the emergence of the middle school movement made the three program columns obvious and appropriate. Details of what goes on inside each of those must be determined by the faculty. However, no part of the faculty can work in isolation if coherent programs are the goal. Thus, the intersections in the matrix become the key, not only to the curriculum redesign process, but to the ultimate integration that will be developed in programs.

CURRICULUM REFORM

One of the most direct routes to educational reform is to change the nature of the curriculum. A number of Project 30 schools focused their efforts on the creation of new courses, new majors, or new requirements in an attempt to improve their teacher education programs. Several institutions choose to more closely align subject matter knowledge and pedagogy, while others took on the challenge of providing courses that would help future teachers be responsive to the multicultural needs of the schools today.

University of Pennsylvania

At the University of Pennsylvania several new subject matter courses that are especially appropriate for future teachers and others interested in child development, teaching and learning, and cognition were designed or proposed. For example, a new course in the psychology and philosophy of thinking was offered for the first time this year to advanced psychology undergraduates, undergraduates enrolled in the teacher education program, and interested graduate students in teacher education or other fields such as reading/language, curriculum and instruction, and school administration. Developed by Dr. Jonathan Baron of the Psychology Department, the course is founded on a theory of rational thinking and on empirical investigation of fallacious reasoning, which makes it stand in sharp contrast to much of what passes for content and pedagogy in the "thinking skills" craze characteristic of many school systems.

A new course that focuses on research on teaching was developed by Dr. Marilyn Cochran-Smith. This course will be taken by secondary education students and some elementary education students along with graduate students in administration, curriculum, and supervision. This is not a course in research methods, nor is it intended to prepare students to write dissertations or do school-based research. Rather the course is designed to explore critically the research literature on classroom teaching processes as well as the contrasting conceptual and methodological approaches upon which this literature is based.

The course is intended to help students become aware of the major substantive areas in the field and develop a critical perspective on contrasting paradigms. In the course, students and teacher raise questions about the implications of research on teaching for curriculum, instruction, evaluation, and teacher education. The course conceptualizes the teacher as a deliberative and reflective professional who reads educational research intelligently and then takes the results as starting points for decision-making about actual classroom situations.

Faculty at Pennsylvania have also worked across disciplines to revise both subject-matter and pedagogy courses in the social sciences, which is a central subject matter area for both elementary and secondary school teachers. Unfortunately, courses in the social sciences generally do not provide the kind of understanding that prospective elementary and secondary school teachers need. Dr. Walter Licht of the History Department and Dr. James Larkin of the School of Education worked collaboratively to redesign two core courses offered in elementary and secondary social studies teaching and to rethink some of the other traditional social science offerings.

A modified elementary social studies course was co-designed and co-planned, and cross-visits between education and history are now in place. A secondary social studies course was also redesigned. The intention of both redesigns was to help students better understand the forms of inquiry of the social sciences and to consider thoughtful ways to teach these to their own students.To support the development of inquiry and provide thorough grounding in the social sciences, a core of courses to be taken by prospective teachers in those disciplines was established. Seminars for students considering careers in history and social studies classroom teaching were also offered in order to help prospective teachers take what they learn in their social sciences classes and transform it to inspire their own pupils with new ways to think about critical issues.

University of Delaware

The University of Delaware Project 30 team believed that something needed to be done to better ensure that future elementary school teachers would have a reliable understanding of the actual curriculum they would be teaching. They looked with concern at the case of a recent NSF video in which some of Harvard's graduating seniors—at their commencement—were asked how it is that we have seasons. Without hesitation and with confidence they each replied incorrectly that it was because the earth was closer to the sun in the summer and farther away in the winter. Yet each would no doubt know the distance between the earth and sun, that days are of different lengths, the shape of the earth's orbit, that the seasons differ by hemisphere, and so on—all facts, that upon reflection, are inconsistent with their response. The point is that the nation's best and brightest are not themselves well-grounded in an essential, but a relatively simple, part of the elementary school curriculum. And it would not be hard to document that gaps like this exist among our best and brightest in all aspects of the elementary school curriculum! At the University of Delaware, the Project 30 team considered six proposals for the reform of the arts and science component of the teacher education program Delaware offers prospective elementary teachers. The team members were the chairs of the Departments of English, Mathematics, History, Philosophy, and Educational Development, an Honor's Program faculty member in Chemistry, the associate dean of the College of Arts and Science, a faculty member in science education, a faculty member of the Department of Physics, and the dean of the College of Education, who chaired the team.

Currently Delaware's students take a modest number of basic arts and science general education courses, about one-quarter of their total program, plus the equivalent of a minor in a field of study outside Education.

The team explored six approaches to the question of the elementary academic major, and, as these are not mutually exclusive, the final outcome could very well have features from each approach within the interdisciplinary major option that was ultimately recommended by the Project 30 team.

Delaware's proposed interdisciplinary major is actually a collection of reworked minors in six areas—mathematics, foreign language, history and social science, English and language arts, natural science, and fine arts. Each "minor" is responsive to the unique requirements of the elementary school teacher insofar as each has courses tailored to the needs of the elementary school teacher, either through the integration of the methods courses or by the addition of special sections of subject matter courses. The interdisciplinary major option is fairly conservative and administratively feasible. It represents about 80 credit hours of focused study, a considerable increase in the current program, but still affords only minimal levels of study in each area. Yet it is an honest approach insofar as each major area of the elementary school curriculum is addressed in a coherent manner.

The team considered several ways in which the separate minors could be reshaped with the interests of the prospective elementary school teacher in mind. Five themes, or some combination of them, are under discussion by the faculty members who are designing the courses that comprise each minor.

1. Philosophy of subject matter. In this approach the philosophy of each subject matter (e.g., philosophy of science) is taken up, and essential and fundamental aspects of the structure of the subject matter are covered. Elementary science instruction, for example, would be improved if teachers understood that there are no facts apart from theories or that "true" theories are not those that were proved, but only those that have failed to be disproved. Similarly, social studies education would be improved if teachers would view the history curriculum not so much as the recreation of the past, but as one of several possible stories of the past that could be constructed to make sense of the same historical events. The barriers to an understanding of mathematics would be lower if teachers appreciated the similarities in the grammar and syntax of mathematics and language.
2. Text approach. This approach entails a close reading of seminal texts (the "great books") in each area coupled with an examination of school textbooks for the assumptions each makes about the discipline in question. The logic of this approach, like the philosophy of the disciplines approach, is that the core structure of each discipline is addressed directly by the initial promulgator of an idea who (like a teacher) takes on the burden of making his or her ideas clear to an audience (like a classroom of pupils) who hears them for the first time. The teacher's grasp of the origins of important ideas may provide a good foundation for the teaching of these ideas to pupils. This approach is not to be confused with the discredited "cultural epoch" approach to curriculum and pedagogy, in which the mental development of

young pupils was thought to recapitulate the race's cultural and intellectual history.

3. Genetic Epistemology. This option entails the study of the developmental psychological literature from the perspective of the development of the concepts that make up the curriculum. In this approach the prospective teacher learns the relevant developmental constraints upon the pupil's acquisition of the curriculum and lays out, as an unavoidable part of the discussion, the nature of the subject itself. The story of how the young child develops the notion of number, for example, is valuable in its own right, but also reveals salient portions of number theory, the arithmetical algorithms, and other aspects of mathematics. Similarly, the account of the child's moral development reveals the principal issues in moral philosophy and political theory.
4. Cognitive Psychology. In this option, the student would major in cognitive psychology and make the workings of the mind his or her specialization. The subject matter content would be picked up through the consideration of how the mind operates mathematically, aesthetically, and so forth. Like the philosophy of the disciplines or text approaches, this approach would provide a structure for the reformed minors in each subject area. Each area would be approached from the perspective of how we think about and know the content in question. The approach fits well with the current trend in cognitive psychology that stresses the domain specificity of our thinking.
5. Pedagogical Content Knowledge. This approach addresses the fact that teachers, even professors, inevitably transform what they know into a teachable subject. They give the subject a new structure and meaning, one that is appropriate to their students' level of understanding. These structures can be studied and codified. Since this reformulation of the discipline is inevitable, one might as well address it directly and, as in the other approaches, use it as a way to structure the reformed minors.

In teaching *Huckleberry Finn*, for example, the teacher inevitably interprets the book as a story of race relations, or generation gaps, or an historical period, or latent homosexuality on the frontier, or whatever. How is this done and shouldn't the academic major address this question explicitly? As another example, many science teachers attempt to clarify the nature of electric current by comparing it to the behavior of water currents in various sized pipes. Is this a good way to think about electricity, and how would one know? The answer to the question is not to be found in physics or in education, but in a qualitatively different kind of knowledge that will come from conversations between disciplinarians and pedagogues.

This knowledge—the knowledge of what is a telling example, a good analogy, a provocative question, a compelling theme—is a proper object of study in an academic major and could yield the kind of understanding of the disciplines that is deep and generative. To have multiple ways of

> representing a subject matter, to have more than one example or metaphor, to have more than one mode of explanation, requires a high order and demanding form of subject matter understanding.

Concurrent with the Project 30 proposals, Delaware has developed a plan for the restructuring of the pedagogical portion of the elementary teacher education program that is consistent with the Holmes Group reforms. The two components, the Project 30 proposal and the Holmes proposal, will be debated by the full faculty during the Spring 1991 and presumably be implemented as reformed undergraduate program of about 130 credit hours or an entirely new option for a master's/undergraduate program of about 150 hours that will lead to a master's degree in pedagogy based upon an undergraduate interdisciplinary major of the type recommended by the Project 30 team.

Baruch College

At Baruch College a Joint Committee on Teacher Education began its work by exploring certain fundamental principles that would give their new curriculum coherence and integrity. Committee members agree that prospective elementary and early childhood teachers need a broad background—what the curriculum document labels "Foundations." In the course of an elementary or early childhood teacher's career, she or he may be called on to teach a wide variety of subjects, to develop projects for students, and to teach in different grades (K-6). Both versatility and depth are required.

Constructing a new curriculum that speaks to so many different objectives is difficult, especially since the Joint Committee set as its task answering this question: what is it that elementary (K-6) and early childhood teachers (N-3) need? In other words, the Joint Committee has not approached the idea of a new curriculum in terms of disciplines, majors, or academic departments. The Committee's intent is to provide enough depth for those students wishing to attend graduate school at the master's level and to provide a set of courses in the liberal arts that enhances the education certification sequence. The structure of the new curriculum suggests that professional courses and a concentration in liberal studies is the best way to integrate pedagogy and content.

The new curriculum included two major components:

1. Foundations (79-81 credits)
    Mathematics, Natural and Behavioral Sciences (19)
    Health and Physical Education (3)
    United States Studies (9)
    World Studies and Foreign Language (27-29)
2. Liberal Studies / Education Concentration (48-54 credits).

Elementary or early childhood students move from the Foundations sequence to one of the following concentrations: Humanities, Natural Sciences, Social Studies or Mathematics/Computer Science. In both the liberal studies concentrations and in the education certification sequence, there is an interdisciplinary focus that is achieved by close collaboration of Liberal Arts and Sciences and Education and Educational Services faculty. As a result, the Joint Committee has developed a Liberal Studies/Education Concentration for the second half of the curriculum that carries on the thrust of the Foundations sequence.

While the liberal studies concentration and education certification sequence constitute separate elements, they are conceived as interdependent, with methods and field-related courses in education linked to interdisciplinary capstone courses in the liberal studies concentrations. The intent of this innovation is to strengthen content and pedagogy. Upper-level courses must demonstrate how the knowledge acquired in the Foundations sequence is applicable to the curricula taught in the schools. In the new curriculum, students taking Methods of Teaching in the Content Areas (part of the Education Certification sequence) will also take the interdisciplinary capstone methods course.

This new course in each of the four concentrations will be jointly planned and taught by Education and Educational Services and Liberal Arts and Sciences faculty members. A content specialist in social studies, for example, will team up with an Education specialist to design a course that fuses content and pedagogy and builds upon the coursework in both the liberal studies concentration and the education certification sequence.

This coordination between the liberal studies concentration and the education certification sequence is the cornerstone of the new curriculum. One of the fundamental principles agreed upon by the Joint Committee on Teacher Education is that the preparation of elementary and early childhood teachers cannot be enhanced by simply piling more liberal arts courses onto the backs of students. Such a mechanical exercise would suggest that teaching is merely a matter of stuffing more knowledge into students' heads.

The new curriculum, on the other hand, recognizes that faculty members in both Schools must teach their courses in terms of others' objectives: the liberal studies, natural sciences, humanities, and mathematics in the elementary school classroom. The education certification sequence must incorporate a liberal studies perspective, orienting students not only to general teaching methods but to precisely those techniques that seem to work best for the content they wish to communicate.

The program will lead to a Bachelor of Arts degree with three quarters of the credits in the liberal arts and sciences. It will lead to provisional state certification. The program will be governed jointly by the Schools of Education and Educational Services and Liberal Arts and Sciences. A Teacher Education Coordinating Committee (TECC) will help monitor the coherence of the curriculum, review course proposals and revisions, and, through a coordinator, monitor the orientation and progress of students.

University of the Pacific

As part of the University of the Pacific's efforts in educational reform, the requirements that the education majors must meet have been revised. Since the knowledge of a subject that is essential for teaching it is also central to "knowing" it, the Project 30 team believes that courses that are appropriate for teachers should be appropriate for all students. As a consequence, the revised credential program has not only been adopted as the Liberal Studies major in the School of Education (for elementary credential candidates), but it has also been adopted with minor changes as the Liberal Studies major in the College of the Pacific, where it serves (with an Integrated Studies major) as an alternative for all students who do not wish to pursue a regular disciplinary major. The Deans of Education and the College of the Pacific have recently agreed that from now on all elementary credential candidates will matriculate in the School of Education. The University General Education Committee has determined that those who complete the new Liberal Studies major in either college have thereby satisfied the university's general education requirements.

As a capstone experience to this new program, a pedagogical seminar will require students to complete a significant project analyzing how specific subject matter in their area of concentration may be transformed and represented through examples and illustrations, metaphors, and analogies so that it may be effectively taught to a variety of students in a variety of circumstances. Students will work with two practitioners—a college faculty member in the discipline and an elementary school teacher—and their students to observe, consult with, and analyze their teaching and learning and to develop narratives of how those instructors foster understanding in their students.

Bridgewater State College

At Bridgewater State College, key Project 30 members were able to make reforms in their undergraduate program, as well as to compensate for whatever remaining shortcomings they perceived, by designing a clinical master's program that achieves what should be a very effective integration of the disciplines. For undergraduates, the goals of Bridgewater's efforts were (1) to strengthen the liberal arts background of teachers by requiring all teacher preparation candidates to major in a liberal arts or science discipline, (2) to transfer more of the training of teachers out of the college classroom into field-sites, and (3) to increase the number of minority students preparing to teach. Most revolutionary of Bridgewater's programmatic reforms was the establishment of a two-stage certification process, in which undergraduate teacher preparation programs will provide only provisional certification and a clinical master's with a substantial field experience and mentorship will be required for full certification.

The program designed for the clinical master's, now proceeding through governance, will complement the undergraduate programs and achieve an integration of professional education and academic disciplines never before seen at Bridgewater. Each master's level candidate will be guided in his or her program by a committee made up of a mentor, an advisor from professional education, and one from the major discipline. This committee will be solely responsible for designing an individualized program for the student that will take into consideration certification requirements, gaps in the student's undergraduate program, the school's needs, and the student's career objectives. The culmination of the student's program will be a research project that will integrate professional and disciplinary studies.

Enrollments continue to be very high in early childhood, elementary, and special education programs, and a steady increase has been noted in secondary-level programs as well. Master's level certification programs are thriving, providing a vital service to increasing numbers of older-than-average students making a career change to teaching. The well-founded predictions of teacher shortages will apparently continue to fuel these enrollment increases as well.

Brooklyn College

Brooklyn College's curriculum, in response to the crisis in urban education, sees as its mission the preparation of teachers who wish to take responsibility for what happens in schools. The focus is on education as a social process and on school as a working, pedagogical community where students, parents, teachers, and the administrators engage in collaborative work. Studio I, Brooklyn's very first Education offering, introduces an aesthetic model of practice that supports collaboration as students in cohort groups respond to each other's work. This supportive relationship extends to Studio II as the same groups continue to work together analyzing their educational experiences as colleagues. Learning through this kind of bonding reinforces a familiar way of knowing—the association of pleasure and knowledge connected to people we care about.

In this curriculum, collaborative activity is pivotal in the paired courses in social science, humanities, and mathematics/sciences in the liberal arts disciplines and education. For example, collaborators should be able to devise appropriate ways of exploring how ecology and politics impinge upon the curriculum, or how sociological knowledge about diverse cultures can be useful for developing thematic projects in the classroom. Through the interaction of their professors and the integration of subject matter, the students in this program will experience first-hand the collaborative process and will have models to emulate.

Students will conduct interviews and create anthologies of stories gathered from their older friends and neighbors; they will examine issues of social adaptation and integration viewed through the prism of different groups; and their own initiative will be a factor in the novels or autobiographies selected for courses. Students' lives and their informed critique of their personal experiences are important content in this curriculum. In some cases, their writings will serve as class texts and be analyzed for insights into the learning process.

Courses in this program will focus on the African-American culture, the Puerto Rican experience and the experience of American Jews as an immigrant community.

Aesthetic experiences are helpful catalysts in this effort because of their emphasis on the human capacity to identify with another individual. When students are engaged by a literary experience and can place themselves in the loner role of Hamlet or Richard Wright's man who lived underground, they begin to understand any young person's identity crisis. Students who do a retrospective of their favorite literature and interview individuals whose cultural background is different from their own broaden their understandings of the similarities and diversities inherent in the aesthetic experience.

Students will learn to appreciate how stories told through dance, paintings, music and literature, though reflecting the cultural background of the teller, can communicate to diverse audiences. This humanities strand of courses acknowledges, to use W.E. Dubois' words, "the gift of the spirit" and the power of culture to inspire concern and develop thought around feeling through aesthetic forms.

Assignments may focus on the social construction of identify, the forms of prejudice, and the relationship between language and culture. In preparation for the students' participation in the schools, they will learn how the public schools of New York City have tried to be responsive to the various immigrant groups and closely examine classroom practices that reflect biases and attitudes about gender, race and class.

The students who sit in Brooklyn's liberal arts sections are frequently graduates of schools in the borough of Brooklyn and many have been taught by teachers prepared for the profession by New York City institutions of higher learning. Education faculty can increase their own awareness of the disciplines and the ways in which they might, for example, link work in biology with child development. At the same time, liberal arts colleagues may transform their own pedagogy after questioning traditional assumptions about how people learn their discipline.

Brooklyn's bridge courses in the social sciences, humanities and mathematics/sciences work towards having students look at themselves as both learners and teachers in varying disciplines. The liberal arts must assist students in recognizing how, for example, political changes affect curriculum or the ways culture is encoded in the narratives that children share.

The new curriculum for early childhood and elementary education majors is structured into three major components:

1. Integrative strand courses in social science, humanities and mathematics/science courses in both liberal arts and education help students integrate and understand the ways that the disciplines are related to learning and teaching. These courses will serve as a bridge between the core courses at the college and the teaching arts courses

in education.

II. The teaching arts courses provide intensive work in the discipline of education, forging connections between learning theory, subject matter content and pedagogy. Work in the major initiated with the Studio course, the first of two such offerings, is followed by courses in teaching the various disciplines and culminates with the student teaching component.

III. Liberal arts courses provide concentrations of twelve to eighteen credits in intermediate- and advanced-level courses in a discipline. These courses address the need for more specification in liberal arts courses, greater depth in an area, and at the same time provide students with greater choice in their course of study.

St. Mary's University

St. Mary's Project 30 team focused on curriculum recommendations with the goal of integrating content and pedagogy. The team proposed to incorporate, within appropriate and already existing core courses, content segments that focus on educational foundations. Once instituted, all students interested in teacher education would be encouraged to register for these specific core courses. St. Mary's hopes that such courses will provide greater integrated knowledge of education, while also creating student interest in teaching as a possible career choice.

These core courses, which integrate educational foundations within appropriate academic areas, would be taught by faculty who "teach as we would have them (future teachers) teach." Such courses would include reflection on areas of teaching and learning, and would ask students to reflect on their own educational experiences. These courses would, when possible, include some observation or service component. This could involve observation or service at child care facilities, schools, nurseries, etc.

Components on educational foundations could include something like the following:

1. "The History and Development of the American Educational System" within an American History course;
2. "Politics and the American School" within an American Politics course;
3. "American Economic Systems and Education" within an American Economics course;
4. "Educational Philosophy in America" within an American Philosophy course;
5. "Ethics and Education" within an Ethics course;
6. "The School and Education in American Literature" within a survey of American Literature course.

These courses would be available to students as core courses throughout their four years at St. Mary's. They would be a source of early integrated learning for future teachers, would add an aspect of intellectual challenge to the concept of teacher-preparation, and could be used to attract new students into teacher education.

In order to better integrate content and pedagogy, a one-hour "lab" component would be connected with courses whose content has a wide applicability in elementary and/or high school teaching. The Lab Component would deal with pedagogy for teaching the specific content of the course. For example, a course in Shakespeare (widely taught in high school) would contain a weekly one-hour lab, in which pedagogy for teaching Shakespeare in high school would be discussed. Labs would be conducted, desirably, by a team—the professor of the course, an education professor, and an elementary/high school teacher. Labs should be conducted as seminars, not lecture classes. Hopefully, "case studies" could be used as part of these labs.

Only those students interested in preparing for teaching would attend the labs. Certification programs would require a minimum of three semester hours in these "labs." The students enrolled for and participating in these labs would earn three credit hours in the specific content area. The one-hour lab could be taken as a fourth hour in a content area. Students would be encouraged to take as many of these labs as possible. Once they had fulfilled the credit requirements of three hours, they would be allowed to free audit these labs.

St. Mary's does not intend to create a curriculum that enables students to pass ExCET tests. Since passing such tests are part of the reality for emerging teachers, they realize that they must establish some methods, other than the regular curriculum and academic content, to assist students to pass these tests. But the St. Mary's team believes that the goal of having the best curriculum for preparing young people to become effective teachers must underlie all of their planning; the curriculum cannot be test-driven.

At Saint Mary's, Project 30 members were also involved in the proposal of a new course in multicultural education. The course was designed to develop the students' understanding of several ethnic groups in the United States through a study of cultural, social, economic, religious, and psychological backgrounds. The course should enhance the students' capacities for humane, sensitive, and critical interaction with these ethnic groups. It should increase the student's abilities to envision future needs and to plan productively for development and growth within an emerging multicultural society. Their abilities to examine their own cultural attitudes, values, and biases should be enhanced. Finally, students should learn to relate multicultural issues to educational concerns and the role of the teacher.

The course would focus on three major cultural groups of the Southwest (especially Texas): Anglo, Black and Hispanic. These cultural groups would be studied in the following six areas, with the aspects essential for teaching in multicultural classrooms given special consideration:

A. History
B. Customs and Traditions
  1) Religious Attitudes and Beliefs
    a) Affecting academic goals
    b) Affecting self-esteem
    c) Affecting career/life goals
  2) Family Traditions and Customs
C. Values
D. Language and Aptitudes
  1) Student Evaluation
    a) Testing for academic achievement
    b) Testing for intellectual ability
    c) Testing for career placement and life goals
  2) Special Education
  3) Curriculum and textbook evaluation
E. Socioeconomic Concerns: Historical Causes, Effects, and Prevention
  1) Health Impairment
  2) Deprivation of food, sleep, shelter, privacy
  3) Deprivation of environmental enrichment
  4) Class issues and political implications
F. Gender Issues
  1) Ethnically based sex stereotypes
  2) Cognitive learning styles
  3) Attitudes toward achievement and life goals
  4) Violence

This course would include some experiential components, such as visiting or working in the following: art and cultural centers, cultural associations, schools, day care centers, health clinics, shelters for the homeless, literacy programs, tutoring, etc. The course would meet 3 days a week. Students would meet in class on Monday and Wednesday. On Fridays, there would be no class-session; instead, students would be required to spend four hours per week as volunteers. These four hours would be arranged according to the students' class and work schedules, in conjunction with a coordinator of the experiential components.

Each student would be required to participate in two experiential activities; for example, a student might spend half a semester in a day care center; and half a semester at a shelter for the homeless. Students would be required to keep a weekly journal of their experiences and to produce a report or case study for the week of mid-terms and the week before the final exam. At these two times, the class would spend approximately one week listening to and discussing these student reports.

Southern University at New Orleans

At Southern University at New Orleans, a pilot course was designed to make the teacher-education curriculum more accurate in the areas of multicultural and international education. The focus was on African-American studies, particularly historical and social issues, and educational pedagogy. For the first time, two faculty members (one history and one education) collaborated on content and methodology and team-taught the course. The classes were video-taped and a video library addressing the theme was begun. This course was also timed to coincide with the African-American curriculum infusion occurring in the New Orleans Public Schools.

A proposal for an international language-culture requirement for education members was presented. Currently education majors are not required to take a foreign language. The proposal, as written, would enable a student to become familiar with African, Spanish, and French cultures and languages. The major focus would not be on language acquisition, but rather on cultural understanding.

Another product of Project 30 for Southern was the development of an Afro-American Humanities course. This course has proven to be quite popular not only with education majors, but among students university-wide.

Southern also received a grant funded by the Louisiana Board of Regents to further evaluate course content, revamp the teacher education curriculum, and inform University faculty of teacher education curriculum reforms.

State University of New York at Buffalo

The State University of New York at Buffalo designed a new general education course in American pluralism as a way of addressing the multicultural theme of Project 30. This course, developed by a committee headed by Professors Elizabeth Kennedy of American Studies, William Fischer of English, and John Meacham of Psychology, responds to the imperative that students in higher education today, and especially prospective teachers, need to know about the changing nature of American society, to understand the issues associated with diversity, and to appreciate the richness of pluralistic cultural experiences in America.

The course, "American Pluralism – The Search for Equality," encourages faculty and students to affirm the rich heritage of pluristic cultural experiences in America while confronting major injustices and inequalities in American life. It is intended to prepare students to live in a self-sustaining and productive manner with the mosaic of cultural experiences in our present and future society. It aims to give students an introduction to the literature of diversity, familiarizing them with the best readings on the topic that our American tradition provides. The goal is to create an intense intellectual awareness of the enriching aspects of cultural pluralism and respect for difference as well as the negative consequences of prejudicial exclusion, while considering not only race and gender issues but also religion, class and ethnicity.

The heart of this course is an anthology of readings, carefully selected to provide insight into the roles that these social categories have played and continue to play in the development of United States history and culture. In its preliminary form, the anthology is several hundred pages in length and includes autobiographies, scholarly articles, statistical summaries, supreme court decisions, historical documents, newspaper articles, etc. Each instructor supplements these core readings with material that provides a perspective from his or her discipline and area of research expertise.

Recognizing the difficulty of teaching such a course, a comprehensive faculty development workshop is offered each summer for new instructors in the course. This workshop focuses on the content and readings of the course and also carefully considers the pedagogical difficulties that might be encountered when students are examining potentially sensitive issues. Instruction began in fall 1989. Instructors have come from such varying disciplines as African-American Studies, American Studies, English, Law and Jurisprudence, Modern Languages, and Psychology.

Student evaluations of the course at the end of the first two pilot semesters expressed remarkable enthusiasm. Students rated the course between 4.3 and 4.6 on a 5-point scale on such key issues of content and pedagogy as importance of the subject matter, quality and openness of the discussions, and relevance to real-life situations. Eighty-three percent of the students agreed with the statement, "I would recommend American Pluralism to a fellow student because of the course content." (Only five percent disagreed; twelve percent were neutral.) More than half of the students felt that the course should be required for all students at the university.

Among the written comments provided by students in their prose evaluations were the following:

- This course introduced me to issues which I had really never paid much attention to before.
- This course helped me examine my own thoughts and the way we stand on issues. It has helped me think about my identity.
- The course showed me a world of different lifestyles all in the same room.
- Every aspect of the course was useful. I learned more in this class than in any other class since I've been in school.

In addition to their course on American pluralism, UB created a course on world civilizations that encompasses culture, literature, art and civilization, as well as geography and history (see also UB's entry in chapter two, "Team Formation.") In addition to the selected text, faculty members assign readings and conduct discussions special to their own disciplines. Thus, for example, a student may select a section of the course that views world civilizations from the perspective of a philosopher or an archeologist. Attempting to give students an awareness of different philosophies, cultures and ways of life, the course emphasizes the development of world civilizations and societies from prehistory to the present. This course is especially important for students who are preparing to be social studies teachers in New York State, since the state has recently implemented a new global studies curriculum.

Section Two

EDUCATION PROGRAM REFORM IN SERVICE

COLLABORATION BETWEEN SCHOOLS

Collaboration can occur, not only between faculty members within an individual college or university, but also between colleges and universities. A number of Project 30 schools participated in such collaborations as a way of extending their services to their surrounding communities and improving the state of education in their areas.

Florida A&M University

At Florida A&M University an important part of the Project 30 process was the collaboration that resulted from two annual national meetings in Houston, Texas, and Monterey, California. At the first meeting in 1989, dialogue was begun between FAMU and Weber State concerning the possible exchange of faculty and/or students between the two institutions for either a semester or a year. This dialogue continued in Monterey, and there has been further correspondence concerning arrangements.

If the exchange program is successfully negotiated between FAMU and Weber State, both institutions will be able to enhance several aspects of their respective programs, not the least of which is multicultural education. Each institution's teacher education programs cater primarily to student populations from a rather localized region of the country and are relatively homogeneous with respect to the nature of cultures or subcultures contained therein. An exchange of this sort would provide faculty and students with an opportunity to explore cultural values and ideas different from their own. Furthermore, it is FAMU's belief that an exchange of faculty members would provide a refreshing variety of training and experience for the participants, resulting in the "import" to each faculty member's home institution of revitalized and rejuvenated teachers.

Also, as part of its Project 30 efforts, Florida A&M University has become involved in the Panhandle Center for Alternate Teacher Education (PCATE), a joint program with Florida State University. This program is tailored to meet the teacher certification needs of individuals who are not certified to teach, but are employed on an emergency basis as teachers in a 13-county area of North Florida, including both public and private schools in that area.

Vassar College

Vassar College highly valued a major conference shared by Vassar and Howard University on the theme of multicultural education (described in Chapter 10). Out of this conference has come a continued relationship between the two schools in the area of minority recruitment. This fall a second meeting will be held on the Howard campus and both schools are already discussing ways to seek funds from other foundations to continue their relationship, with a focus on those minority students who decide to pursue teaching late in their college career. Responses to initial inquiries for funding have been positive.

Southern University at New Orleans

At Southern University at New Orleans, a planning grant was funded by the Rockefeller Foundation for the purpose of strengthening ties between SUNO and the New Orleans public schools and exploring the possibility of a long-range partnership. As a result of the planning grant, a partnership proposal was developed and presented to the Rockefeller Foundation to implement the Comer School-Based Management model in three elementary schools in the New Orleans Public School system and to provide for a school/university retraining center for school-based teachers. In addition, university faculty would be involved with the university/school partnership in areas of content knowledge and pedagogy.

University of the Pacific

In the fall of 1988 and in early 1989, the Project 30 team at the University of the Pacific developed a university/elementary school partnership to improve the teaching of language arts and natural sciences in the elementary schools. The collaboration was to offer benefits in both directions, enriching the teaching of targeted subjects in the elementary schools and improving the preparation of prospective teachers at the university. The Project 30 team hoped to create a climate to support mutual disciplinary and other interests and to foster greater understanding of practice and constraints upon practice between arts and sciences faculty and experienced elementary teachers. The team believed that both groups had contributions to make in each direction, to teaching in the schools and to teacher preparation at the university. The team was particularly interested in collaborating to learn better how to teach disadvantaged minority and Limited English Proficient (LEP) pupils, whose test performance in the targeted subjects was low.

In consultation with officials of the three districts in the Stockton metropolitan area, the team studied a number of schools before selecting three for the initial phase of the partnership. Each has a distinct academic program and socioeconomic mix, but each also has a substantial number of pupils from disadvantaged minority backgrounds. The families of many of these minority pupils live at or below the poverty level.

At Taylor Skills School, a "science emphasis" school in the Stockton Unified system, Southeast Asian (mostly Cambodian and Lao) pupils are 21% of the enrollment, Afro-Americans 26%, Hispanics 27%, Whites 13%, and the remainder a diverse group including Filipinos, Sikhs, Native Americans, and Pacific Islanders. At Mable Barron School (Lincoln Unified), nearly a quarter of the pupils speak languages other than English at home, including Spanish, Chinese, Tagalog, Lao, and the two principal Cambodian languages; the situation is similar at Oakwood School (Lodi Unified). Both Mable Barron and Oakwood are located in middle-class, suburban neighborhoods, but about a third of their pupils are bused in and approximately a tenth of the pupils at each school receive AFDC funds.

These three schools reflect distributions prevalent throughout the city of Stockton, which is remarkable for its cultural and ethnic diversity. Of course, not all minority students are poor or Limited English Proficient (LEP), but many are. The total number of LEP students in the three districts, as reported in the most recent language census, is just over 14,000. It is startling to realize that almost 2% of the entire LEP population in the state of California is attending schools that are within a 15-minute drive of the university. The impact of LEP Southeast Asian pupils on the three districts is quite remarkable: there are 2052 Vietnamese pupils (6% of the total in the state), 1191 Lao pupils (10% of the state's total), and 4725 Cambodian pupils (20% of the state's total). In addition, there are 4226 identified LEP Hispanic pupils, 262 Cantonese, 331 Filipino, and smaller but still significant numbers of LEP pupils who speak Mandarin, Korean, Japanese, Portuguese, and other languages. There are even 2675 identified LEP speakers of "other" languages in the three districts! These and similar facts are frequent topics of discussion at the partnership dinner-seminar meetings. Admittedly, the partnership has yet to focus sustained discussion and study on the pedagogical issues they raise, but doing so is high on next year's agenda.

In the spring of 1989, the Project 30 team and school site administrators invited teachers at each of the three schools and arts and sciences faculty at the university to join the partnership for an initial period of two years. Thirty-three teachers and seventeen professors accepted the invitation. Also joining the partnership were site administrators at the three elementary schools, the deans of the School of Education and the College of the Pacific, and the Vice President for Academic Affairs at the university. At the first dinner-seminar in May, the Superintendent of one participating district and the Science Curriculum Coordinator for the county schools office were also in attendance. The team asked for no financial commitment from the districts at the outset, but made clear the need for visible administrative support.

Activities for partnership participants are designed for several ends. Six dinner-seminars, held at the university, provided an opportunity for relaxed conversation, professional interaction, and enrichment. Seminars also provided opportunity to listen to participants' questions and concerns and a place to exchange information about workshops, lab sessions, field trips, classroom visits (both to the schools and the university), and collaborative research and presentations. A series of workshops and laboratory sessions were presented by science and language arts faculty, as well as a day-long trip to collect geological specimens.

In all instances, attendance was voluntary and most activities were in response to requests from the teachers. Attendance at seminars ranged from 45 to 50 and at workshops from 8 to 25. The dinner-seminars also provided an opportunity to explore new possibilities. Dr. Judy Shulman, from the Far West Regional Laboratory, attended the October 1989 seminar to explain how writing "case" narratives of teaching and professional interactions can stimulate reflective discussion and help focus issues. Dr. Shulman has agreed to work with Pacific's project as part of her continuing interest in "case" literature. Copies of The Intern Teacher Casebook and Mentor Teacher Casebook were provided for participants.

The November 1989 seminar provided for a panel discussion reflecting on the first year of teaching. Pacific's goal was to get a clearer picture of what aspects of teacher preparation program teachers regard as most important. Participation for the February 1990 seminar included a request for participants to reflect on reactions to the project and future directions. Participants were asked to respond to the following questions:

- Where have we gotten to? What, if anything, has been accomplished? Can you review your original expectations and update them?
- What kinds of things would you like to see accomplished this spring and next year (at workshops, at dinner meetings, in collaborative groups, at your own school)?
- How can we move toward the Project 30 goal of identifying ways to improve teaching to a culturally diverse population?

Some reflections follow:

> This project is giving me an opportunity to make a contribution in the improvement of science teaching, particularly physics, at the elementary school level, and to prepare better teachers for this level of education. I personally believe that it is in the primary school level that science should be properly introduced. (Professor Andres Rodriguez, Physics)

> I sense a grass-roots dimension to the program that is very exciting. The people who work in the classroom are talking openly and the rest of us are getting a chance to listen— not to official reports on education, but to first-hand accounts by teachers in the field. (Professor Roger Mueller, English)

> The most beneficial part of Project 30 for me has been talking with University professors about my teaching program. Bob Orpinela has visited my class and he gave me two insights into what and why I was teaching that helped me to be more reflective about what I am doing. I have also learned to use the process of writing to increase my

> understanding of the process of teaching. I have used dialogue journals with my student teacher and my co-teacher. Through writings I have learned how complicated the process of teaching is and how many teaching decisions I make each day. (Virginia Heumann, Classroom Teacher)
>
> It is my hope that those of us in Project 30 would examine, research, and evaluate the experiences of new and experienced teachers and come to some manageable, valid and enduring conclusions about how teacher training can be changed for the better. (Patrice Stendahl, Classroom Teacher)
>
> To date we have attended workshops and garnered some wonderful information, experiments, and projects which are very useful in the classroom. We have also been able to share our views of those types of teacher training that may or may not be useful. (Seven Teachers from Mable Barron School)

The March 1990 Seminar introduced a representative from the Berkeley SUPER Project, a nationally known university/schools partnership program. Pacific was reminded of the need to carefully monitor its progress and continue to make corrections. In April, the seminar was in conjunction with the School of Education's annual J. William Harris Lecture Series and PDK collaborative meeting. The speaker, Dr. Judith Harris, spoke on the vision of technological expansion in our schools. Teachers were offered the opportunity to be brought into the computer network with faculty via a new linkage called Internet.

Workshops and visitations to school sites provided the other focus. A number of workshops in physics, biological science, geology, astronomy, and writing were organized by faculty following teacher requests for assistance with the content of the workshop.

School visitations by liberal arts and sciences faculty on an informal basis were most successful and have resulted in changes in Bob Orpinela's philosophy classes, among others, and a heightened awareness generally about what teachers need to know and be able to do. Bob Blaney's assistance with the development of a moral sense for teachers was well received.

The combination of activities, a new waiver program, and partnership and workshop activities have together created an atmosphere of reflection and professional renewal. While this was Pacific's plan, that they were able to move in this direction so cohesively is encouraging. The placement of Project 30 scholars into courses and into the schools will be a help to the linkages they have established and a barometer of their progress.

In 1990-91, the partners will begin to meet at the participating schools, as well as on the university campus. As each school hosts a dinner-seminar, participants will be able to learn more about programs and circumstances different from their own. Governance and planning for the partnership will also be broadened. As an initial step, it is likely that an administrator and a teacher from each school will be asked to join the Project 30 team. Bringing other schools into the partnership will also be considered.

Dr. Judy Shulman, who spoke at a dinner-seminar this year, has agreed to visit the partnership twice next year to help participants develop narrative vignettes treating the partnership experience as a "case." At the invitation of Maureen Gravett of the Berkeley SUPER project, members of the partnership will be visiting SUPER to compare experiences and share advice. English professor Bob Cox and sixth-grade teacher Patricia Cox are engaged in joint research to understand successful strategies for teaching literature to LEP pupils in a "whole language" program.

Other efforts at collaboration are being considered at the University of the Pacific. The team's original hope that participating teachers might develop into science and language arts "mentors" for other teachers in their districts has taken a slightly different form with the recent agreement of each of the participating schools to become a model site for a particular program emphasis: Taylor School wishes to develop a model science program, Oakwood a model math program, and Mable Barron a model language arts program. These emphases were selected by the schools themselves with the understanding that the full partnership would assist in developing them. District personnel and the county schools office have also expressed support.

Although it is not clear exactly how the partnership will evolve from this point, or how it will be funded, there is considerable trust and enthusiasm for its leaders to draw upon. Participants want and expect to continue. Connecting the partnership with the Berkeley SUPER project through the exchange of visits and speakers should provide experienced help in negotiating the transitions to come. The partnership faces important questions at this point: How can it best move to more broadly shared leadership? How can new participants and new participating schools be incorporated? How can more efforts at collaborative research be fostered and supported? How can partnership activities and programs best be "institutionalized" by the administration of the participating school districts so that teachers' work is acknowledged and rewarded? What is the best way to sustain a focus on finding better ways to teach minority pupils? Where is the money to support the partnership going to come from?

Texas A&I University

In the spring of 1986, the College of Education at Texas A&I, noting the serious teacher shortage in bilingual classrooms in South Texas, decided to select teacher aides who assist with instruction in elementary education and help them pursue college work with the goal of having them attain a reading specialization and endorsement in bilingual education upon graduation.

While working with the project, the College learned that over 6,000 teacher aides were employed in the fourteen counties of South Texas. Through participation in the program, these teacher aides, who currently were earning approximately $7,000 a year, could eventually be capable of increasing their earning power to approximately $20,000 per year, thereby impacting the economy in the region. Additionally, these minority teacher aides, who were already dedicated to helping students in the classroom, could become role models as full professionals in schools with predominantly minority populations. However, because these aides were immobile, the unique challenge for Texas A&I was to modify its program and bring it to the teacher aides rather than to expect the teacher aides to come to the A&I campus.

For its approximately 200 participants—mainly Hispanic women in their mid-twenties through forties, mothers, wives, and often heads of households—Texas A&I University has modified its administrative structure, registration procedures, course scheduling and delivery, as well as its support services, which are provided by a program coordinator.

To assist the participants in making the transition to campus, the University allows them to continue in their positions while working on their degree programs over a five- to six-year period. They enroll for six semester hours of credit every enrollment period (fall, spring and each of two summer sessions). By the time they register for their semester of student teaching, the teacher aides are in residency as full-time students. During this semester, they ask for a leave of absence from their jobs and are eligible for financial assistance.

Since the socio-economic level of many teacher aides is near the poverty index, financial assistance is obtained through local school board stipends, Title VII state and federal funds, Migrant Funds, Pell Grants, Texas Guaranteed Loans, and Hazelwood Grants for Veterans.

In order to meet the educational requirements of the designated population, the Colleges of Arts and Sciences and Education schedule a variety of courses through several delivery systems: (a) long-term courses during the evenings, (b) long-term courses on Saturdays, (c) summer session daytime courses in blocks of three weeks, (d) three weekend minicourses (nine meetings in three weeks), and (e) long-term course offerings by cable television in the outreach area beginning with Benavides, Texas. A course in political science, for example, has been aired over cable television to the adult population residing in the town. This is a cooperative effort between the town of Benavides, the Benavides Independent School System, the Center for Continuing Education at Texas A&I University, and the Department of Political Science at Texas A&I. Participants in the teacher aide program are also encouraged to spend several weekends on campus in order to experience college life.

Course offerings in the program focus on interdisciplinary studies and reading in the elementary school. Summer workshops and inservice day-long sessions, on the other hand, focus on goal setting, image building, study skills, and family management. These workshop topics are among the concerns of the participants.

In the fall of 1988, a random sample of teacher aides who were enrolled in Art 101, Math 221, Education 372 and Education 321 responded to a questionnaire that yielded the following information:

1. The teacher aides were employed in fifteen school districts, twelve of which were located in the Rio Grande Valley.
2. The age range was 18 to 70, and the majority ranged in age from 30 to 40.
3. All 70 respondents were Mexican American.
4. Of the respondents, 68 were female and two were male.
5. The range of college hours completed was 0 to 91. Over one-half of the teacher aides had between 0 and 24 semester hours. Several were approaching 60 hours. These were teacher aides who had transferred from Laredo Junior College, Pan American University-Edinburg, and Texas Southmost College.
6. All 70 were classified as Elementary Education majors with specializations in reading.
7. Fifty-two were married, 12 were single, and six were divorced.
8. The group had entered Texas A&I over a span of 10 years, 1978-88. One began college in 1978, three in 1986, 13 in 1987, and 26 in 1988.
9. Respondents had taken and successfully completed courses in such areas as art, biology, education, history, math, physical education, Spanish, speech and sociology.
10. Sixty-six of the respondents were assisted by one or more forms of financial aid. It was clear that without the financial aid options, many teacher aides could not attend college.
11. The teacher aides felt positive about themselves and described a variety of accomplishments.

Project 30 has spurred Texas A&I's efforts to continue working with teacher aides. Dr. Grace Hopkins, project leader, has been contacted by *Education Weekly* for an interview concerning Project 30. In addition, she has attended a meeting sponsored by Columbia University Teachers College and Howard University at the University of Delaware, where she spoke on the involving of minority teacher aides in Texas A&I's teacher education program.

The Project 30 team strongly believes that the program needs to be expanded to other locales in South Texas, and the project leaders are committed to involving more school districts in bringing the project to its fruition.

Weber State University

As part of its Project 30 goal of serving the educational needs of its area, Weber State University formed The Teacher Academy, an association of content area teachers who meet periodically during the school year to interact, to receive recognition, and to experience personal enrichment and professional growth. The Academy is based on the premise that outstanding K-12 teachers should be given opportunities to advance the quality of teaching and, in the process, benefit the communities in which they work and the parents and children they serve.

Academy teachers are selected by their districts in the spring of each year for the following school year. Approximately 40 teachers, half elementary and half secondary, are invited to attend the Academy, which meets five or six times during the school year. Activities for each year include a recognition and get-acquainted banquet; involvement with other professional organizations, such as the Utah Association for Supervision and Curriculum Development and the Utah Association of Teacher Educators; presentations by prominent educational leaders; workshops on subject-specific topics of interest and importance; and opportunities for participants to share ideas and information with fellow Academy members. Membership in the Academy is a personal and professional honor and one that should be shared by distinguished educators.

During the 1989-90 school year, the Academy focused on social studies teachers. During 1990-91, the Academy will focus on science teachers. The Academy will function on a five-year subject-specific rotation of teachers—Social Studies, Science, Mathematics, Language Arts, and Humanities and Healthy Life Styles.

The Academy functions under the on-going direction of a Teacher Academy Steering Committee made up of representatives from the participating school districts, Weber State, and other interested parties. Funds to assist in the financing of the Academy come from the districts, the college, and private sources. The Academy was very successful in its initial year (1989-90) with social studies teachers as Academy fellows, and the 1990-91 Academy with science teachers promises to be equally successful.

Weber State has also found its work with area schools and organizations has been helpful in the collection of information on which to base curricular reform. One of the central projects related to Project 30 has been to develop an assessment process for all alumni that deals not only with their Education School experiences at Weber State, but also with their arts and sciences background. Based on the information collected from questionnaire responses, the team hopes to make major recommendations for piloting new academic models and restructuring existing programs toprovide future secondary school teachers with a better academic preparation.

The procedure included forming a committee of 20 college instructors and seven secondary school teachers, from various disciplines and backgrounds, to brainstorm ideas, procedures, and intended goals. A detailed questionnaire was prepared and sent to 155 teachers who had graduated from Weber State in the last five years. The questionnaire dealt with the demographics of the respondents, their teacher education preparation, their preparation in their major area, their preparation in their minor area, and continuing education for teachers over time.

The questionnaire stated that Weber State was interested in finding out "whether or not [Weber State University] has served you well in preparing you for your career in secondary education."

About 40% of the teachers responded to the survey, and a sub-committee analyzed in great detail and recently made extensive recommendations for further discussion, approval, and implementation. The recommendations were in the areas of teacher education preparation, preparation in the areas of academic major and minor, and in inservice programs for teachers. These recommendations were presented to the appropriate units for review and reaction and possible implementation. The administration of the college has been urged to support the piloting and restructuring of specific objectives by providing funds.

In addition, Weber State has continued its support of the Utah Geographic Alliance and the Ogden Area History Teaching Alliance. Both of these academic alliances involve K-12 teachers in the northern Utah region. Both have been highly successful in closing the social gap between professors and teachers and in broadening the appeal of history and geography in the schools. These two alliances provide vigorous support for their disciplines and provide an opportunity for teachers at all levels to share ideas and information. In 1989, the History Alliance received the Utah Association of Teacher Educators' Exemplary Project Award.

Weber State has found that changing the program of studies for the preparation of teachers is as difficult as changing the curriculum in any other phase of higher education, e.g. general education requirements or multi-disciplinary majors. The differences in philosophy about the direction of the programs are as varied; the goals of the program are as diverse; and the assumptions that underlay the individual courses are as strongly held. The collection of data by groups representing a wide spectrum of beliefs benefits the change process and should continue to support innovation in the months and years to come.

State University of New York at Buffalo

The State University of New York at Buffalo collaborates with local schools by offering an innovative workshop to area teachers. For example, UB's holocaust workshop uses and demonstrates an interdisciplinary teaching process in which a professor of psychiatry (Professor Norman Solkoff) and a professor of history (Professor William Allen) present the psychological and historical factors leading to the holocaust, the preparations for genocide, the genocidal process, responses to knowledge of the holocaust, and the aftermath. The workshop has been offered to about 250 secondary school teachers. Like UB's world civilizations course, this workshop is in step with the new social studies emphasis in New York State on global studies. Both contribute to the Project 30 theme, International Perspectives.

California State University at Los Angeles

At California State University at Los Angeles, the Project 30 team selected fine arts and mathematics as the content areas of their project, and early on the CSLA team concluded that having a public school partner as a full participant in the effort would be the best form of collaboration for their project. After much discussion, it was decided to invite Ramona, a small K-8 school near campus, to participate. The principal, a graduate of the CSLA credential program in educational administration, was new to her position and most enthusiastic about working with the university.

The fine arts focus of the project involved the desire of the principal to initiate a variety of "elective" classes in music and the visual and performing arts, which at the time were absent from the curriculum because the school district could not afford to provide specialists for them due to severe budgetary constraints. Thus, the major impediment to providing these subjects was a lack of expertise and training for the "volunteer" art, music, and performing arts teachers. After discussion with the campus team, a plan was formulated that would bring faculty from the university to Ramona to provide in-service training and on-site technical assistance in the delivery of instruction in these areas. Also, the plan included a number of field trips to the university for plays and other events sponsored by or produced by the School of Arts and Letters or its departments.

The project in mathematics was somewhat different. Students at school did not have the opportunity to take any mathematics beyond typical eight grade "general" math. With the help of a mathematics faculty member from the School of Natural and Social Sciences and a pedagogy faculty member from the School of Education, a mathematics teacher at Ramona designed a pre-algebra class for eighth grade students with the aptitude and potential to successfully complete the course. Using part of the funds from Project 30, the team agreed to purchase calculators and textbooks for the students in the pre-algebra class.

The team enjoyed the opportunity to work collaboratively among the three university divisions and Ramona. Of course, with resources being what they are, additional financial support would have been extremely beneficial.

Brooklyn College

Brooklyn College has collaborated with Kingsborough Community College in preparing a jointly registered program supported by the New York State Education Department. Recognizing the strengths of the Brooklyn College program while restructuring the education offerings of Kingsborough, the faculty from the two colleges have met for the past two years in complex negotiations to design experiences that honored the ethos of each institution.

Questions about course content and pedagogy, as well as the pivotal issues surrounding culture and language, have been addressed. The result has been the drafting of a Jointly Registered Program which, when adopted, will enable students from the two-year college to graduate from Brooklyn College as education majors in a cohesive, viable program.

Baruch College

At Baruch College, Ms. Cecily Gottling and Professors Cecelia McCall and Emily DiMartino developed a proposal for a demonstration project, KIDLINK, for two New York City elementary classrooms. The goals of the project are to promote the development of multicultural and technological literacy for the participating children and, in addition, to provide for greater communication between the college faculty and the students, student teachers and cooperating teachers in these classrooms.

Over a period of several months, the three colleagues discussed their ideas with many Baruch faculty and staff, including Project members, school personnel, and corporate representatives. They have refined the proposal and are currently seeking major funding. Baruch provided start-up resources for summer 1990.

Three forms of literacy—the written word, multicultural awareness, and technological skill—will be linked in a unified learning experience for the demonstration group. This initial phase of the project will unite the students and teachers in a third grade class at Public School 87, a multi-ethnic New York City elementary school (where Dr. DiMartino supervises student teachers), and the second graders at Hunter College Campus Schools, well-known for its racially diverse and academically gifted student body (where Ms. Gottling teaches fourth grade); the student teachers of Baruch; and faculty members from the School of Liberal Arts and Science, the School of Education and Educational Services, the Education Computer Center, and the Library.

At the outset, KIDLINK participants will study historical primers: their purpose, their impact on the target audiences, their usefulness as historical sources, and their literary structure. This analysis will be based on a curriculum developed as a pre-project activity by the student teachers, cooperating teachers and college specialists. After studying these aspects of historical primers, the elementary school students involved in the project will write their own multicultural primer, reflecting their cultural backgrounds and values.

Through their participation in KIDLINK, the students of today and the teachers of tomorrow will develop a basic multicultural literacy that includes:

- familiarity with cultures from all continents;
- familiarity with ways of learning about other cultures—openness to differences and variety;
- an ability to communicate the values of one's own culture without imposing these values on others.

The content of the multicultural primer will be developed using a writing process method, oral history, family participation research, and field trips. Each learning experience will be focused around a single letter of the alphabet and will consist of an exploration of the important people, ideas, stories and objects of importance in each child's culture.

Students will be organized into work teams across classrooms in order to promote access to other children from differing backgrounds. A variety of communication, media and information technologies will be used by the children for the following purposes:

- to gather information
- to send and receive information
- to analyze information
- to produce information

All KIDLINK classrooms will be connected via Fax machines, telephones, computers, and television monitors. The children will use computerized data bases as well as develop one of their own. Word processing and desk top publishing software will be used for writing and presenting the KIDLINK primer. Video and audio equipment will provide a visual/spoken alternative to the written word and will be available for gathering data at home and in the field.

In cooperation with their classroom teachers, these student teachers will develop lessons in writing techniques, reading, research skills, computer and technology skills, and social studies.

Student teachers will work with Baruch College faculty to develop a curriculum unit focusing on the themes of prejudice, cultural conflict, positive cultural contacts and conflict resolution. Because of their work in both the schools and the College, student teachers will serve as the liaison among all the KIDLINK participants.

Baruch envisions in the years to come that this pilot project will grow into a regional, national and international network of KIDLINK classrooms connected through technology and experimenting with other curriculum projects that reflect the goals of the program. It is anticipated that the KIDLINK network will be supported by a multicultural/technology center at Baruch College.

IMPROVING MATHEMATICS INSTRUCTION

A number of Project 30 schools focused their reform efforts in the content areas of mathematics and science. Since math and science have been identified as problem areas at every educational level in this country, Project 30 schools seeking to improve the teaching and learning of math and science are engaged, essentially, in a service activity: service to their education students, service to the communities whose schools would be hiring these future teachers, and finally, service to our country. This chapter describes a number of projects to improve mathematics education, each focusing a different approach.

State University of New York at Buffalo

At the State University of New York at Buffalo Professor Stephen Brown of the Graduate School of Education has been teaching a linked pair of courses, one for undergraduates and one for graduate students, dealing with mathematics and humanism. The courses grow from the observation that mathematics is perceived by most students as an overly technical subject that is unconnected with general culture and with questions of value and aesthetics.

The undergraduate course is a seminar for honors students. Against a backdrop of mathematical content focusing primarily on topics from elementary number theory, the course seeks to identify ways in which mathematics connects up with experiences of a non-mathematical nature. Among the themes explored are the functions of metaphor in mathematical thought; the role of language in mathematical experiences; surprise and its functioning in thinking; humor and the mathematical experience; the tensions between problem posing and problem solving; anxiety and the doing of mathematics; and the different forms of mathematical discourse.

The graduate course is a seminar intended for graduate students in the arts and sciences as well as in education. Students are sought who enjoy reflecting on matters of epistemology in their fields of scholarship, who are concerned with questions of the relationship of personhood to the acquisition of knowledge and who thrive on ambiguity as well as interdisciplinary exploration. Although this seminar has actually attracted only education students (with one exception, a student in library science), the students do represent diverse fields, including anthropology, history, English, mathematics, computer science, foreign languages, and philosophy of education.The students in the graduate seminar, in teams of three, assist with the teaching of the undergraduate seminar. In preparation for teaching an undergraduate class, each team presents on two successive weeks its conceptual and pedagogical agenda to the graduate seminar for criticism. Following the class, the team presents to the graduate seminar an evaluation of the teaching experience and writes a paper analyzing some aspect of the theme and/or pedagogical issues related to it.

After some experience teaching these courses, the instructor reflected as follows on the impact of the course on the graduate students:

> My primary impression is that new worlds were opened for the graduate students in terms of ways of perceiving mathematics in non-technical ways. Perhaps the most valuable part of the experience for them was the opportunity for mathophiles and mathophobes to collaborate in an effort to understand an emerging body of knowledge and to team-teach the undergraduates. It was a source of both amazement and potential research for students talented in mathematical thinking to discover that colleagues of theirs with a literary bent could think quite abstractly, yet be frozen by the introduction of a mathematical variable in the conversation. On the other hand, several of the humanists accurately identified an inclination of the mathophiles to cover up rather than expose their thinking by the use of symbolism.
>
> The seminar was, among other things, an opportunity for beginning as well as experienced teachers to inquire into fundamental pedagogical issues. I was particularly impressed with the zeal with which they sought supplementary reading material for graduate as well as undergraduate class presentations. In addition, they were able to organize their teaching of the undergraduates in an experiential rather than didactic manner. Heavy emphasis was placed upon strategies for framing issues in an open manner and in encouraging as many different points of view as possible.

Turning to the impact on undergraduates, the instructor commented:

> Though they felt comfortable expressing themselves in class, the [undergraduate] students for the most part were not well disposed to listen carefully to each other. Unlike the graduate counterparts, the two cultures among the undergraduates (i.e., the mathophiles and the mathophobes—in this case with a negligible intersection) were less inclined to learn from each other. In addition, they were considerably less introspective than I had hoped.
>
> Perhaps the most fundamental difficulty with the content of this course was that it was for the most part exploratory in nature. While there was an inclination to discuss opinions, many of the students (especially so among the mathophiles) tended rather quickly to operate on the conversation as if it were a traditional mathematics problem. There were frequent comments to the effect, "Oh yes. I get it"—implying that the conversation could thereby end—when in fact we were just laying out the problematic terrain. They were for the most part less inclined to explore the new terrain in a creative way than they were to "grasp it" as if they were preparing for a test.

University of Pennsylvania

At the University of Pennsylvania, Dr. Herman Gluck and math department members, in consultation with faculty in teacher education, redesigned a math course with the interests and needs of prospective elementary school teachers in mind but also open to other students in the School of Arts and Sciences. Rather than focusing on advanced mathematical functions and analysis, the course explores how mathematical concepts are formed; the strategies that children and adults use to think about, set, and solve mathematical problems; and the history and philosophy of mathematics. The course emphasizes collaborative learning, hands-on puzzles and problems that introduce more complicated mathematical concepts, and the use of brainstorming and other problem-solving strategies.

The problem with the course is its tremendous popularity. Because it offers a different way of thinking about and knowing concepts in math, the course has attracted many students who are not majoring in education but who wish to pursue college-level math. Fortunately the math department has arranged for education students to enroll in specially designated recitation sections where issues of learning and pedagogy are emphasized. Informal assessment indicates that the course makes a difference in the competence and attitudes of teacher education students who later take a required course in the pedagogy of mathematics at the school of education.

University of Dayton

Students at the University of Dayton in the elementary education program were required until 1988 to complete a one- semester math class and to take a second math methods class. Faculty members in the Department of Teacher Education decided to add a new math course to the curriculum in 1989. However, both students and faculty expressed concerns that an additional math course in and of itself was not sufficient. What students needed was a class that provided them with appropriate new mathematical knowledge for teaching in an elementary school. A committee of three teacher education faculty and three faculty from the mathematics department was formed to design a new mathematics course with this goal in mind.

The new jointly-signed course extends students' mathematical skills and problem-solving abilities and is intended to foster greater understanding for the mathematical concepts that form the basis for the curriculum in elementary mathematics. The course is not "watered-down" math, but rather a course designed and taught to be of direct benefit to students desiring to teach at the elementary level.

Howard University

At Howard University a mathematics content and a mathematics methods instructor held regular meetings to review their course syllabi to identify points where concerted effort needed to be made to connect theoretical and practical matters related to teaching. Subsequently, these two professors held fruitful discussions on modifications that both should make in order to produce a content-pedagogical balance in their instruction.

The instructors then visited schools to observe elementary and secondary students in the pre-student teaching of mathematics to determine further changes or modifications for their teaching. They met with the Project 30 Team to offer suggestions for continuation of this practical exercise and to recommend that a science component also undertake a similar examination, as math and science are areas of most critical need. Key players in the science area, a botany professor and the science methods instructor, have volunteered to undergo a similar exercise.

University of New Mexico

At the University of New Mexico, the Project 30 team began serious planning in the summer of 1988, with the initial focus on communications, in particular the liaison efforts of the Joint Mathematics Advisory Council (JMAC). This committee is a unique partnership among the Department of Mathematics and Statistics, the College of Education, and the Albuquerque Public Schools. It had started some years previously as one of several such committees for different disciplines. This was the only surviving group, and the aim of Project 30 was to see that it not only survived, but thrived.

The previous year, JMAC had sponsored a beginning effort in the area of student preparation modeled on a widely-imitated program initiated in Ohio during the late seventies: the Junior Mathematics Prognostic (JUMP). This mathematics placement examination was given to students at a number of high schools around the state while they were juniors and still a year away from graduation. The idea was to convince students to remedy possible mathematical deficiencies while still in high school. Project 30 team was interested in continuing the JUMP program.

Another plan was to apply for an NSF grant to identify outstanding high-school mathematics teachers, bring them together for workshops and a recognition banquet, and connect them in a computer network. This was modeled on successful programs in Minnesota and Nebraska.

After the Woodlands meeting, which the Project 30 team found intellectually challenging and full of innovative ideas, the team continued to emphasize the rapidly expanding JUMP project and began a new effort: teacher enhancement workshops in the use of the new calculators capable of drawing graphs on a screen. The belief was that the use of these low-cost tools could make a qualitative difference in the way students learn. One of the first steps a trained scientist takes when confronted by a problem is to draw graphs of the functions involved. Even if a solution is not immediately forthcoming, considerable extra insight is obtained. By contrast, the average mathematics student sees the construction of a graph as just an additional burden. Sadly, this attitude is often well grounded since, more often than not, the student's graph is incorrect and misleading. The committee felt that the use of the graphing calculator would help the student adopt the problem-solving techniques of the trained scientist. Emphasis would be on the use of the calculator as a laboratory instrument to gather data and check hypotheses.

In the spring of 1989, the Project 30 team continued its efforts in the areas of both mathematics placement and calculator training. Professor Nancy Gonzales, a Project 30 team member and director of the JUMP program, organized a "debriefing" meeting in Albuquerque that was well-attended by participating teachers from around the state. Response to the meeting was overwhelmingly positive, and an unexpected benefit was found to be the sharing of ideas and the "networking" among the teachers. Project 30 team member Dr. Metzler, in partnership with a teacher at Highland High School, presented a workshop on the use of low-cost graphing calculators for middle and high-school teachers in April. Also in the spring of 1989, the team received word that the University of New Mexico Foundation had agreed to fund a program of six Saturday workshops in the use of graphing calculators to be presented at locations around the state. Teachers selected to participate would be given a graphing calculator and trained in the use of the machine.

A new direction for the committee was an experimental calculus course to be offered in the fall of 1989 that would also take advantage of the graphing calculator. Dick Metzler was scheduled as the teacher and the plan was to give students long-term individual projects, often involving use of the calculators, that would encourage them to analyze a problem in depth. Instead of an exclusive regimen of examinations that reward good short-term memory, the students would be given tasks that required organized sustained effort. This more nearly corresponds to the real situation of the world of work. The effort was modeled on a successful program at New Mexico's sister institution, New Mexico State University.

At about this time the Project 30 team became more involved in an ongoing JMAC project to monitor the proposed changes in the standards for mathematics teacher certification in New Mexico. Team members Rick Scott and Nancy Gonzales started communicating with interested parties about the requirements for certification in mathematics. The hope was that it could be ensured that those students minoring, as well as those majoring, in mathematics, would have an adequate background for secondary instruction.

In the early fall of 1989, Project 30 team members joined representatives from the public schools, the College of Education and the Department of Mathematics and Statistics in a JMAC-inspired project to design new "hands-on" pre-service curricula for elementary teachers. The idea was to incorporate the use of manipulatives in these courses and to model effective teaching.

Though the multi-year proposal to the National Science Foundation was not funded, the Project 30 team was pleased to hear that an Eisenhower grant had been obtained for a four-week course in the summer of 1990. Dick Metzler was scheduled to teach this course which would train teachers in the use of the HP-28S "supercalculator" in their classrooms. Planning started for the recruitment of twenty teachers from around the state.

In October the first Saturday calculator workshop was held in Las Cruces, New Mexico. Calculators were available for twenty participants and there were 45 applications. A second session was scheduled for Las Cruces in November to accommodate the overflow.

In early 1990, the team sponsored additional workshops on graphing calculators. The calculator workshops continued true to the pattern found in the first two. Each mailing produced twice the number of participants that could be accommodated at a single workshop and a make-up was scheduled. The workshop experiences illustrated the unique psychological holding power of the calculators; it was often difficult to get the participants to break for coffee or lunch.

The summer course in the use of the symbolic, graphing "supercalculator" was first advertised in January. Fifty applications were received for the twenty openings. The course started in June and each participant was given a calculator and had his or her tuition paid. Participants from outside Albuquerque were given a stipend for per diem. Attendance was excellent and, as was noted at the workshops, people often worked right through the break. Another measure of commitment was the fact that seven of the twenty purchased their own accessory printers.

The participants in this four-week course agreed that the calculators would have the most classroom impact by far, if their students could experience the "psychological holding power" for themselves. The unanimous opinion was that every effort should be made to obtain a "traveling classroom set" of nine or ten calculators to circulate among the participants. Approval from the granting agency has been requested for a transfer of funds to obtain such a classroom set.

Two NSF applications have been submitted for programs to train college instructors and high school teachers in the use of the HP-28S. Another Eisenhower application will be submitted for a 1991 summer program to serve the people turned away this summer.

The team is confident that the continuing efforts in the areas of workshops, summer courses and elementary teacher training will have a significant positive effect on mathematics education in New Mexico.

IMPROVING SCIENCE INSTRUCTION

A number of Project 30 schools chose to focus their efforts primarily in the area of science education.

Winthrop College

Winthrop College already had in place distinctive courses in the sciences for students preparing to become elementary and early childhood teachers. These courses were not watered-down versions of "real" courses offered to non-education students but rather laboratory courses designed to meet the needs of prospective teachers. Nevertheless, the instructors wanted to examine these courses in light of current research in student misconceptions as well as their own informal findings that Winthrop students were not relating the science course content to their lives.

Thus, Project 30 at Winthrop College began with discussions between selected faculty in the School of Education and the College of Arts and Sciences on appropriate science content and teaching strategies for elementary and early childhood education majors. These discussions focused on those courses required for elementary education and early childhood majors. These courses have been offered at Winthrop for ten years and were based on early National Science Teacher Association (NSTA) standards, which are now the basis for NCATE standards for elementary science teachers.

The assumption underlying these standards is that students will learn more meaningful science content and processes through laboratory investigation than through a traditional lecture course. Winthrop had developed three courses to meet these standards, each laboratory based and carrying four semester credits: Investigative Physical Science (PHS 103); Investigative Earth Science (GOL 120) and Investigative Biology (BIO 210). Because of the interests and expertise of the faculty involved in Project 30, the Winthrop team decided to focus their work on the physical science and earth science courses.

In order to further their Project 30 goals, Winthrop agreed that a faculty member in the School of Education would teach sections of the physical science course along with faculty from the Chemistry/Physics department. This encouraged close cooperation and discussions among the team members who taught the courses. While they did not team-teach, they planned cooperatively and met weekly to discuss the courses. In response to Whitehead's admonition to "teach few things but teach them well," they identified the major concepts within physical science and earth science that should be known by any well educated non-science major. These concepts included:

Investigative Physical Science
- Study of Motion and Newton's Laws
- Energy Transformation and Conservation
- The Atomic (Particulate) View of Matter
- The Organization and Structure of the Universe

Investigative Earth Science
- The Theory of Plate Tectonics
- The Atmosphere and The Oceans
- Earth Materials and Surface Processes

Once the instructors agreed upon the "big ideas" of the courses, they identified student misconceptions about these fundamental concepts and designed learning activities to dispel these misconceptions. For example, the literature documents student misconceptions relating to laws of motion, the atomic view of matter, and Earth-Sun relationships. The instructors identified student misconceptions by administering paper and pencil items adopted from interview questions. A sample item is shown in the illustration for "The Case of Jane."

After the major concepts were identified, learning activities were designed to teach these concepts. Whenever possible, the activities were designed around the teaching model known as the learning cycle, which consists of three stages: exploration, concept development, and concept application. Much of the process of Winthrop's Project 30 effort, particularly for the actual teachers, was devoted to working and reworking content topics, activities, and labs to be used in the courses.

In the Spring of 1989, the effort to revise these courses began. That first semester, a faculty member from the School of Education taught a section of PHS 103 in addition to those sections taught by Arts and Sciences faculty. The faculty teaching PHS 103 and GOL 120 planned cooperatively. The initial modification of these courses was to identify the major concepts to be taught and to design learning cycles to teach them. As each semester progressed, changes in the courses evolved from mutual experiences. For example, topics to be taught were added or deleted, the order in which the topics were introduced was changed, and activities were modified. This evolution is ongoing as of this writing.

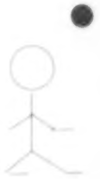
The results of this approach have been disappointing thus far. In spite of the instructors' possessing strong pedagogical content knowledge, assessing for existing student misconceptions, and developing specific activities to address them, student misconceptions in science remain extremely resistant to change. To illustrate this point, consider the case of "Jane":

> Jane is a bright, attractive, hard-working, pleasant young woman majoring in elementary education with a cumulative grade point ratio of 3.7 on a 4.0 scale. Jane is one of those students that make the teaching profession

rewarding. She will become an outstanding teacher. In short, Jane is one of the college's very best. Yet, Jane serves to illustrate how firmly science misconceptions are held and how resistant to change they are.

In the summer of 1989, Jane took PHS 103 (Investigative Physical Science). As a pre-test, Jane was administered a Piagetian interview (the pendulum task) and based on that task, is fully formal operational. In addition to the pendulum task, Jane completed a test on common science misconceptions. On the "tennis ball" item (see illustration) Jane responded in a classic Aristotelian manner that the force acting on the tennis ball was always in the direction of travel (b-c-a) as opposed to the Newtonian view that the force of gravity is acting on the ball at all points in its flight (a-a-a). This is not a surprising result. In one study of misconceptions, fewer than 22 percent of physics students chose the Newtonian view of a-a-a on the item. Thus, one objective of the PHS 103 course was to cause the students to modify their world view from that of Aristotle to that of Newton.

Suppose a boy throws a tennis ball a little way up into the air.



If the ball is on the way up, in which direction is the net force acting on the ball?

A. ↑ B. ↓ C. There is no force on the ball.

If the ball is at the top of the flight, which arrow shows the net force acting on the ball?

A. ↑ B. ↓ C. There is no force on the ball.

If the ball is on the way down, which arrow shows the net force acting on the ball?

A. ↑ B. ↓ C. There is no force on the ball.

The Tennis Ball Question

At the end of the course, Jane was again asked the "tennis ball" question on the final exam. This time, Jane responded with a Newtonian answer of a-a-a. In addition, she could explain her answer in an acceptable scientific manner. Two weeks later, Jane enrolled in Elementary Education 431: Teaching Science in the Elementary School. As a portion of that course, a quiz on science misconceptions was administered that included the "tennis ball" item. To the chagrin of

> the instructor, Jane responded as she had at the beginning of the investigative physical science course: b-c-a, the Aristotelian answer. One interpretation of this result is that Jane "learned" the Newtonian answer for a school requirement (PHS 103) but that school knowledge was kept separate from her personal knowledge of the world around her.

The questions we are left with are: How many students leave science courses with their personal knowledge unaffected by what they have studied? If a student's personal knowledge is unaffected, has the student learned the content needed to be a teacher? If a student's personal knowledge is unaffected, how can that student develop the pedagogical content knowledge needed to teach the subject to his/her students?

The experience with "Jane" was instructive, demonstrating how difficult it is for college instructors to effect meaningful learning. Yet, clearly it is crucial for elementary teachers to have a deep understanding of their subject matter. That is, the prospective teacher must understand the "big ideas" of a discipline, the relationship of these ideas within the discipline and to other disciplines, and the processes by which knowledge is generated within the discipline. Without this understanding, teachers will continue to view their role as helping pupils simply accrue information about a discipline rather than guiding students to an understanding of the discipline. Equipped with a deep understanding of the discipline, the teacher will be more able to develop the pedagogical content knowledge necessary to be an effective teacher.

There are significant barriers to the development of a deeper understanding of science by non-science majors. Perhaps the most significant barrier is the misconceptions that students bring with them to class; whether one calls them misconceptions, alternative frameworks or naive theories, they serve as lenses through which students view the world. Often, the student's view not only is erroneous, incomplete, and fragmented but interferes with learning. Research had shown that these misconceptions were difficult to change. However, the degree of resistance by students to change and modify their understanding of the physical world was astonishing.

A second barrier to student's development of a deep understanding of a discipline is his/her experience with school. College students have had a minimum of twelve years experience in school, which has taught them the rules of the "game of school." This game is a simple one; if you tell the teacher what (s)he wants to hear, you win. The "game of school" does not often encourage reflective thinking.

This conditioning of students caused them difficulty with the exploration phase of the learning cycle. Rather than approaching the investigation from a spirit of intellectual inquiry, the student assumed that the instructor would eventually reveal the desired answer. Thus the student saw little need to observe and measure carefully, reflect on the possible interpretations of the data and draw logical conclusions. The student often became frustrated when the instructor did not behave in the expected way. This often necessitated that the laboratory investigations be repeated two or more times to obtain meaningful data.

In light of their experience through Project 30, Winthrop is refocusing the target courses on critical content and student outcomes and modifying the instructional delivery in PHS 103. Rather than relying mainly on the learning cycle as the instructional strategy, Winthrop intends to explore other models such as the generative learning model of Wittrock or the concept mapping model of Gowen and Novak.

University of Maryland at College Park

At the University of Maryland, Dr. Linda Berg wrote the syllabus for a proposed capstone course for life science and science education seniors. The theme selected for this prototype, pilot course, was global climate change. The course is conceptualized as an interdisciplinary investigation of global greenhouse warming with specific attention to the causes, probable consequences, and ways to deal with it over the next 100 years. The content of the course will include attention to scientific data but will also require students to consider social, historical and policy factors associated with the topic.

The students will be encouraged to organize into small teams on the basis of the topic to be addressed in a term paper. The instructor will review all proposed topics. Term papers will be five to ten pages in length. Maryland believes that this course will make the science education students better teachers because they will be guided to view science in the very broad context of the impact of global warming on people and institutions.

The global climate course fits in with Maryland's revision of its undergraduate curriculum under the campus-endorsed plan, "Promises to Keep." This document includes a senior capstone experience for each major:

> As much as possible, the capstone course should be a culmination of the student's baccalaureate study. The course should be designed to maximize the student's opportunity to use the discipline(s) of the field, to bring together learning from different parts of the curriculum, to resolve important problems that are raised by the exercise, and to deal with relevant value questions. In other words, the work should require the student to demonstrate the ability to synthesize ideas, to think critically, to exercise judgement, and to communicate the results of her or his work.

The proposed global climate course constitutes the Maryland Project 30 team's effort to develop a senior capstone experience for seniors majoring in the Colleges of Life Sciences, Agriculture, and Education (specifically Science Education), which would help students visualize their discipline within a broader "liberal arts" framework.

The course, Biology 495, focuses on a significant biological issue or problem (the impact of global climate change) for investigation. It will incorporate an interdisciplinary approach so that participants will come to a thorough understanding of all aspects of the issue. It will utilize research data and literature from various disciplines. It will ask specific questions that may be addressed from a number of perspectives: those of scientists, educators, Americans, and world citizens. This course will serve as a prototype for future capstone courses to be developed in the Colleges of Life Sciences, Agriculture, and Education. Approval will be sought as a capstone course for the University's Core Program when the Core Committee is ready to consider capstone courses.

Some of the questions that Biology 495 will focus on include:

a. What factors contribute to global change?
b. What means do scientists have to understand the causes of climate change?
c. Can scientists really predict future change, and what are the uncertainties?
d. What are the implications of global climate change for policy makers? businesses? average people?
e. What can educators do to help students reduce and/or prepare for global climate change?

The course will be divided into three parts. (1) It will examine the causes of global warming and the scientific evidence for the greenhouse effect to obtain a thorough understanding of the problem. (Evidence from a number of scientific fields will be presented, including biology, geography, chemistry, meteorology, and astronomy.) (2) It will examine problems that may result from a warming of the Earth, such as a rise in sea level, changes in precipitation, and increased incidence and severity of tropical storms. (3) It will develop a comprehensive plan to address these problems. Weekly discussions will center on selected films and readings. The last five discussion sections will be used for presentations (the class project).

A short research paper relating the impacts of the global greenhouse effect to disciplines outside science will be required. Paper topics, which must be approved by the instructor, include:

1. Global greenhouse as a manifestation of Judeo-Christian doctrines.
2. An examination of the politics of global warming.
3. The impact of the threat of global change on the environmental movement in the United States.
4. The history of the human impact on global climate change: when it all began.
5. Winners and losers: global change will impact different nations in different ways.
6. The effect of global warming on public health policies.
7. The sociological effects of global warming on major cities.
8. The economic impact of global change: who will pay?
9. Technological "fixes" for global warming.

10. A position statement on whether we should tax emitters of greenhouse gasses.

The class will be assigned the following project: As a group of experts on the greenhouse effect and global climate change, you have been assembled by the President of the United States to develop a comprehensive 10-year plan to address the issue of global warming.* Your plan must include these 5 components:

1. Prevention of global climate change.
2. Mitigation of the effects of global climate change.
3. Adaptation to global climate change.
4. An education program on global climate change, grades K-12.
5. Costs of prevention, mitigation, and adaptation.

(*Note: The main focus of the class project in Spring 1991 will be to develop a 10-year plan for the United States. Future class projects might be to develop a comprehensive 10-year plan for the United Nations, a 100-year plan for the United States, or a plan for a Third World nation such as Bangladesh.)

University of Dayton

Elementary education majors at the University of Dayton have been required to take two science courses, one biological and one physical, as part of their general education at the University of Dayton. In reviewing elementary curricula, however, the faculty felt that much of the content was related to earth science. At the February 1990 meeting of the Department of Teacher Education, the faculty voted to add geology to the preservice curriculum. The course was selected after extensive discussion with faculty from the geology department and following substantial faculty dialogue about the type of science content knowledge that prospective elementary teachers need in order to successfully teach science in an elementary classroom.

Vassar College

As a part of their Project 30 work, Vassar College proposed a new model science education course for elementary teachers that would entail having senior faculty in Biology working with teacher practioners. The course had a successful trial run, attracting 18 senior elementary education students, and combining field and classroom work. The process of working out the participation of a senior faculty member in Biology set the stage for a repeat of the course in 1990-91.

The science education course, Vassar feels, will be a permanent part of the teacher education sequence, and they are discussing with the Dean of the College a consistent way to staff the course with senior faculty from Biology. Undoubtedly this results in a closer relationship between liberal arts and education faculty. The course is team-taught and the students are generally from education, with a scattering from other areas.

Memphis State University

During the course of Project 30 at Memphis State University, science departments have become increasingly involved in inservice teacher education. The Departments of Geography and Curriculum and Instruction, for the first time, jointly conducted a geographic literacy workshop, a three-year NSF inservice project for teachers. A Department of Physics faculty member, sponsored by the College of Arts and Sciences and Project 30, accompanied a team of Shelby County science teachers to the American Institute of Physics Association's summer institute on "Operation Physics." Two faculty members in Chemistry received a grant from the American Chemical Society to attend the Institute for Chemical Education's summer institute in Madison, Wisconsin. They subsequently began planning summer courses in Chemical Demonstrations for elementary and secondary teachers in conjunction with two Kids Camps. The Department of Chemistry hosted a "Doing Chemistry Workshop" for teachers in October of 1989. The Department of Biology expanded its "Let's Talk Biology" seminars.

Even the planning that took place for the national Project 30 Monterey conference had an impact on science education in the area. The team developed brochures, posters, and a slide show for the meeting and one of the brochures was able to serve a dual purpose. In addition to detailing Project goals and activities for other Project 30 teams, the brochure was used to inform area teachers of planned events. Copies were distributed to all science teachers in two school systems, as well as to science department chairs of all independent schools in the Memphis area. For the first time, information from science and education departments regarding programs for both students and teachers was consolidated. If a chemistry workshop for teachers was offered the same week as a physics workshop for teachers, it was by design, not by accident. The completed brochure was the culmination of intensive collaboration and planning by both the Project 30 team and an Advisory Board.

Some problems arose with distribution of Project 30 materials. Since poor communication between teachers and the University had been cited by the Advisory Board as a problem, flyers and announcements were mailed out prior to every planned activity. At first, no attempt was made to coordinate these mailings, with each department sending out its own. The normal method of delivery was through the city and county schools' mailing system, thereby by-passing the U.S. Post Office.

While city and county personnel were happy to provide this service in the beginning, it wasn't long before the county's science education coordinator telephoned to say that her staff was being inundated with printed material: "Help! It's wonderful to get all this material telling us what is going on, but my staff is now working for Project 30 one day each week." To alleviate pressures on her staff, the Project 30 team secured a list of all the science teachers in the city and county schools, categorized by school. Each science department chairperson was then sent a package containing enough flyers for each science teacher within his/her school. This greatly decreased both the time needed to prepare mailing labels (now computerized) and to sort the mailing (both tasks originally done by the system staff). The new system worked out very well.

In January 1990, the physics department hosted its annual Unity in Science teacher inservice day. A sit-down luncheon was held for approximately 275 teachers. There were no formal presentations during the luncheon, but teachers had the opportunity to interact with Project 30 team members, session speakers, and MSU faculty and administrators.

In order to coordinate and tend to the details of the scheduled activities, a graduate "Seminar in Science Education," CIED 7/8608, was created so that each student enrolled took responsibility for planning, organizing, and carrying out one or more assigned Project 30 activities. For instance, the graduate student who supervised the collaborative high school program received credit for her activities, as well as peer support throughout her efforts from fellow students enrolled in this course. Other students conducted each of the four Unity in Science Symposia, organized the state Science Association of Tennessee meeting, worked with city representatives to coordinate city-wide Earth Day activities, and planned the public presentations on Global Warming. One of the requirements for the course was a report on the experience, suitable for publication.Members of this course made up the Project 30 Support Team. They were assisted by the Project Coordinator, whose duties included compiling information from each of the participating departments into a cohesive package to be distributed to area teachers. The coordinator was also responsible for preparing and distributing all announcements, brochures, symposium programs, and nomination forms for teacher workshops, and assisted the science departments in their planning of summer workshops. Each department handled its own secretarial duties, although the team leader's secretary took responsibility for all financial arrangements.

The Project 30 team sent one member to the National Universities Continuing Education Association Conference in February. The conference, whose theme was "Science as a Liberal Art," provided additional insights into how to improve science education and also served to establish further contacts with science literacy and space telescope specialists.

Following up on their initial enthusiasm regarding the uses of technology in education and instruction, the Project 30 team initiated efforts to raise the awareness of both the MSU administration and faculty about the new uses of such technologies as interactive videodiscs linked with voice synthesizers and overhead projectors using liquid crystal displays. A team member contacted the Vice-President of Planning and Public Service, who arranged for a demonstration of the media capabilities of MSU's Fogelman Executive Center. The team subsequently toured other MSU facilities to assess media technologies available, particularly in the College of Arts and Sciences. They then contacted a local video consulting firm, Memphis Communication Corporation (MCC), and arranged a preview session of its technological capabilities for selected administrators and faculty at the MCC studio.

Eighteen MSU representatives attended. This preview resulted in additional support for the Project 30 team's commitment to making such technologies readily accessible to both students and teachers on campus. The Project 30 team contacted the regional Senior Academic Specialist from IBM, who brought a three-member team to Memphis State. The team met with College of Education and Arts and Sciences Deans and faculty members. The Vice President for Academic Affairs was also present. Finally, the team ordered the Educational Testing Service's "Classroom Management Interactive Videodisc" they had previewed while at the national Project 30 meeting in Monterey, and arranged a showing for all chairs and directors in the College of Education.

As a result of the Project 30 team's efforts, both administrators and faculty members have become more aware of the uses of new technologies in education and instruction. Meanwhile, several meetings were held for those students identified by their departments as interested in pursuing teaching careers. In January of 1990, Project 30 team members met with undergraduate science pre-teaching majors and discussed new teacher licensure requirements, up-coming events of interest to prospective science teachers (such as the Spring Symposia), the Tennessee Student Assistance Corporation's forgivable student loans for prospective math and science teachers, and other information related to science and to science teaching.

For many students, this meeting provided their first demonstration of support from university science professors for entering teaching fields. (The two undergraduates that participated in the collaborative high school experimental program described below were recruited from this pool.) At the request of the students, a second meeting was held in April to discuss science teaching as a career. Members of the Advisory Board were invited to share experiences with the students. This meeting was particularly beneficial to both students and team members, as it gave them an opportunity to hear about science teaching from people who both enjoy and are dedicated to teaching as a profession.

Also in April, the Project 30 team arranged for each team member to attend the National Science Teachers Association Convention in Atlanta. Transportation and stipends for attending the Conference were provided for the Advisory Board members and for each member of the Support Team (the graduate science education course). Half a dozen very excited undergraduate pre-teaching majors also received transportation and some financial assistance from Project 30.

The Project 30 team conducted a one-hour presentation on its activities at the Convention, which included introductions by the science education professor and the chemistry chairman, as well as comments by members of the Support Team and undergraduate pre-teaching majors present. The Atlanta experience proved inspirational for all who attended and served to further cement the bonds developing between undergraduate and graduate science majors, Arts and

Sciences faculty members, College of Education faculty members, and area high school teachers.

Two special projects were also initiated by the Project 30 team. One of these projects was an experimental program in science education and teacher preparation, a collaborative project between Memphis State and a Shelby County school. Memphis State was invited to assist in developing an alternative educational experience for an advanced biology class whose teacher had unexpectedly quit mid-year. The Project 30 team designed a program whereby undergraduate science pre-teaching majors could get biology or education credit for an apprentice teaching experience at the high school.

Only two students chose to participate, but their experience was invaluable. They were supervised and instructed by a graduate student who was also an experienced biology teacher. As designed, this program not only gave undergraduate science majors the opportunity to teach in an actual classroom setting, it also brought high school students onto the Memphis State campus to participate in regularly-scheduled college labs. A complete report of this program is available from MSU's Project 30 team on request.

The other special project was a Unity in Science symposium. It consisted of four after-school sessions in which representatives from each Project 30 science department made presentations to help teachers update their content knowledge. The first symposium focused on "Demonstrations in Science," and involved professor/teacher/student teams conducting demonstrations. The session was approved by the school systems for professional growth points and provided teachers with specific instructions for duplicating the demonstrations in their own classrooms.

The second session, "Misconceptions in Science," began with a videotape of interviews with students in line for their diplomas at Harvard. The interviews showed how some basic concepts in science are misunderstood, even by college professors. Each science department then proceeded to demonstrate and discuss misconceptions present in its field. During the third session, "Science, Technology, and Society," representatives from biology, chemistry, geography, geology, and physics described how their professions have been modified over the years, how each science has been changed by technological advances, and how the focus of each science has shifted due to sociological changes.

The final session was entitled "Unity in Science." Memphis State science faculty, using water as a unifying theme, described such processes as desalination of salt water, where Memphis gets its drinking water and how it is processed, and the use of swamps to purify water from strip mine runoff. Other scheduled activities for the Spring of 1990 included special presentations by the Biology Department, the Geography Department, and the Curriculum and Instruction Department.

During the summer of 1990, Project 30 assisted the Chemistry Department in providing overlapping experiences for experienced high school chemistry teachers, inexperienced elementary school teachers, and middle school students.

Focusing on "Chemical Demonstrations," the format involved initial university instruction to the high school teachers who then assisted in teaching the elementary school teachers who then produced a series of chemical demonstrations for students enrolled in two Kids Chemistry Camps.

The Geography Department offered a NSF course for elementary teachers as well as a course entitled, "Geography for Teachers." The Physics Department offered two courses specifically for teachers, "Fundamental Concepts of Astronomy" and "Fundamental Concepts of Contemporary Physics." They also presented the "Operation Physics" workshop a second time. The College of Education continued its summer "Environmental Education Workshop for Teachers," and co-hosted a one-week residential "Marine Biology Workshop for Teachers" with the University of Southern Mississippi.

Memphis State's Project 30 received substantial financial support from the University Office of Academic Affairs and a Title XX Eisenhower grant. In addition, the Dean of the College of Education, the Dean of the College of Arts and Sciences and the Vice President for Academic Affairs created a climate of support which greatly facilitated the activites and accomplishments of Project 30.

Chapter 7

INTEGRATING MATH AND SCIENCE INSTRUCTION

Some of the Project 30 schools felt that problems in mathematics and science education could best be tackled if the two disciplines were not separated, and so focused their energies on an integrated reform of the math and science components.

University of Wisconsin-Milwaukee

The University of Wisconsin-Milwaukee undertook curriculum reforms in order to do something about the poor state of math and science education in this country. Public criticism of math and science teaching is rampant, especially criticism of teaching in the elementary grades. Research has shown that degeneration of pupil interest in science and technology begins in the early grades. Much of this can be traced to the anxiety the teachers themselves have for these subjects in the classroom. Youngsters pick up this anxiety and conclude, "If this person, whom I respect, has avoided a reasonable knowledge of the water cycle (for example), then why should I learn it?"

Wisconsin-Milwaukee believes that the situation in American elementary schools is very serious. A 1985 national survey showed that a significant fraction of elementary teachers feel poorly qualified to teach science. UWM's objective in revising its science core is to ensure that future UWM graduates feel confident in their knowledge of the sciences. Their objective in strengthening the math core is to prepare teachers for the NCTM standards, as they apply to elementary teaching. These new standards will require elementary teachers to teach subjects such as estimation, measurement, shapes, rudimentary statistics, and the use of manipulatives (e.g. calculators). This is not a throwback to the old post-Sputnik "new math." These reforms will be adopted, slowly perhaps, but inevitably. UWM's new curriculum anticipates these developments.

In the current curriculum, virtually no elementary education students take more than Math 109, the required course. The curriculum provides little latitude for electing additional courses, but more importantly there are essentially no other math courses for students to take since all other courses offered by the Department of Mathematical Sciences either are of a non-credit, remedial nature or are a quantum step upward in their level (i.e. courses intended for engineering, science, or math majors). This situation puts an additional burden on the three-credit math methods course. Its primary intent—to transmit effective teaching techniques—is compromised by the limited mathematical knowledge of the preservice teachers, people with only a single university math course.

The science component of the core exhibits a different problem. In a typical semester (e.g., fall semester 1989) UWM offered 44 sections of 27, 100-level courses that have essentially no prerequisites. This array has evolved to fill a variety of needs—all in service to one or more university programs. They provide the science knowledge necessary to meet one or more student needs: to satisfy general education requirements, to serve as prerequisites for higher level courses, to meet admission requirements for professional school, etc.

In principle, there is enough variety in this array to meet any student's need. But what if the student can invest only nine credits? What courses should he or she take? Any combination of three courses leaves too many holes. No single three-credit course can impart a complete overview of biology, or chemistry, or earth science, or physics. (Note that with four basic science disciplines, any combination of three courses is fundamentally deficient.) Yet these are the choices presented to the students.

Over the years, there has been a random pattern of science courses taken by elementary education students. This falls short of the expectations of the National Science Teachers Association. Furthermore, traditional science courses may actually sustain misconceptions and negative attitudes vis a vis science in the minds of the preservice teacher, a condition found in studies elsewhere (Stepans, Beiswenger, and Dyche, 1986).

In short, although the UWM curriculum for elementary teachers has a sound general base, it has some inadequacies with respect to math and science. Among the plethora of competing requirements the curriculum is designed to satisfy, math and science cannot have a pre-emptive, high profile. It is necessary, therefore, that a very "efficient" program of science, math, and methods courses be used to improve the situation.

For example, it is impossible to prepare a future teacher to teach the entire spectrum of topics contained in the NCTM standards in a single three-credit math course. In order to teach topics such as estimation, geometry and space sense, measurement, probability and statistics, and pattern relationships the teachers must have a didactic education that includes these subjects. A new two-semester math course accommodates this need. By planning it simultaneously and in tandem with the math methods course, proper anticipation of the full set of NCTM standards has been assured. The math course will teach the appropriate subject matter; the methods course will give heavy emphasis to the use of manipulatives, students working in cooperative groups, and students communicating in mathematics orally and in writing—all essential elements of the NCTM standards.

UWM's curriculum also recognizes that science lab work may be used to reinforce mathematical concepts for preservice teachers. The use of calculators or computers to process data is an obvious connection. The analysis of the processed data is a concrete application of statistics. Measurements of lengths, capacity, weight, area, volume, time, temperature, and angle are often done in lab exercises. Other crossovers will also be evident, thereby increasing the effectiveness of both the math and science coursework.

A modular minicourse approach to teaching science has also been adopted. It has the great merit of providing preservice teachers with the breadth of knowledge they should have to teach science in the elementary grades. No longer will their core coursework be random. Nor will essential topics be missing from the mix of coursework. Instead, there will be a smooth flow from one minicourse to the next, each syllabus an integral part of the overall objective—to provide an adequate base of scientific knowledge to those who must teach it to youngsters. UWM will attempt to guide 50 students per year through the following courses:

- Math 175, Mathematical Explorations for Elementary Teachers I, 3credits
- Math 176,Mathematical Explorations for Elementary Teachers II, 3credits
- Astronomy 175, Solar System Astronomy, 1 credit
- Atmospheric Science 177, The Atmosphere, 1 credit
- Biology 175, Introductory Cell Biology for Teachers, 1 credit
- Biology 176, Introductory Animal and Plant Biology for Teachers,1 credit
- Biology 177, Introductory Ecology for Teachers, 1 credit
- Chemistry 175, Chemistry: Concepts and Models, 1 credit
- Chemistry 176, Elements and Compounds: The World Around Us, 1credit
- Chemistry 177, Chemical Reactions: New Substances from Old, 1credit
- Geoscience 175, The Earth's Surface, 1 credit
- Geoscience 176, The Mobile Earth, 1 credit
- Physics 175, Motion and Heat, 1 credit
- Physics 176, Electricity and Light, 1 credit
- Natural Science 275, Science, Technology, & Society, 1 credit
- Curriculum & Instruction 375, Teaching of Mathematics, 3 credits
- Curriculum & Instruction 376, Teaching of Science, 3 credits

The one-credit courses will be given as five-week minicourses, three per semester. Coordinated scheduling of these courses will be necessary to avoid chaos and scheduling conflicts for the students. Two sections of each science course are scheduled so that class size may be limited to 25 students. It will take a student two full years to complete twelve credits of science coursework. This scheduling format will allow an individual student to register for a three-credit "string" of minicourses each semester. (The program coordinator works with the departments to organize such a schedule for each semester.)

The 100-level minicourses will be taken by freshmen and sophomore pre-education students. The last three courses will be taken after admission to the School of Education, i.e. in the junior and senior years. The two methods course, C & I 375 and 376, serve the traditional purpose of preparing the teachers for effective communication of subject matter knowledge to their pupils. The "Science, Technology, and Society" course will help tie the subject matter learned to contemporary societal issues.

UWM has recognized that these courses interact with each other. The topics in any single course have implications for material taught in other courses. For example, appropriate lab exercises will be cited in the math course, in the methods courses, and in the Science, Technology, and Society course. The entire program of coursework has been developed collaboratively.

The minicourses will not be taught in the traditional lecture and lab format that characterizes the three- and four- credit courses. Instead, the teaching techniques in the minicourses will be modeled more closely to what future teachers will likely be asked to do in their classrooms. This will be accomplished by having an experienced science education professor work with the science professors as they develop and first teach the minicourses. As a result, the science faculty will teach the minicourses differently than they would a traditional three- or four-credit course.

The proposers have been able to place themselves in the position of the students. It is conceivable that this program of courses would constitute 60 percent of the math and 90 percent of the science knowledge for a given student. It follows that the transmittal of this knowledge must be cohesive and effective; pre-education students do not have the luxury of iterative courses that build sequentially the knowledge they need in math, biology, or chemistry.

From the outset, the committee assumed it was looking at the "natural science/math core" together with the science and math methods courses. They recognized that this is only a small fraction of what a preservice elementary teacher must take. They knew they had to be restrained in what they could recommend. However, the committee was looking for more than just small-scale modification, and their initial fact-finding proved this to be fortuitous. Their committee work has made disciples of education reform of all of UWM's Project 30 members. The commitment to this project is such that each new course will be taught by a member of the committee, the only exception being a replacement for a professor who has retired.

University of Georgia

The College of Education of the University of Georgia is implementing a program they hope will provide specialists in mathematics and science for the early grades. They are currently in the planning and pilot stages of implementation of this project.

The objective of the project is to develop an undergraduate preservice program to prepare elementary school teachers to function as resource teachers in the area of science or mathematics. These resource teachers would be able to provide other teachers with suggestions concerning methods and materials for the teaching of science or mathematics. They would be able to suggest applications of science or mathematics in other subjects and suggest ways in which science or mathematics could contribute to the "integrated day" format currently popular in the early grades. The graduates would have state certification to teach grades kindergarten to four. Beyond certification requirements, they would have additional work in science or mathematics content and work in science or mathematics education designed to prepare them as resource teachers at the elementary school level.

The preparation of such specialists is recommended by the National Research Council in *Everybody Counts:*

> The United States is one of the few countries in the world that continues to pretend—despite substantial evidence to the contrary—that elementary school teachers are able to teach all subjects equally well. It is time that we identify a cadre of teachers who would be well prepared to teach young children both mathematics and science in an integrated, discovery-based environment.

Georgia sees their proposed program as the beginning of a career path for those students who ultimately wish to become curriculum and instruction specialists in science or mathematics for young children. Certainly they do not see this program producing a finished specialist. A mathematics or science specialist would require, both for certification and by any reasonable standard of competence, substantially more course work and experience in the classroom. Undergraduates with special interest and ability in mathematics or science can, Georgia believes, learn more content than is required for certification and can become knowledgeable in methods and materials of instruction in their field.

The project involves the creation of a new career track within the undergraduate program. Even though this track is closely related to the standard program in elementary education and will result in the same certification, a substantial effort is being undertaken to create and implement this program. Georgia's preliminary investigations of the number of students who may wish to participate and the number of schools that may wish to hire these graduates indicate that the program will fill a definite need.

As part of the development and revision of courses, mathematicians and scientists working with mathematics and science educators and elementary specialists will review existing courses to select those that provide content appropriate for development of elementary resource teachers. Course revisions and the development of new courses will be undertaken as needed and will be focused on integrating content knowledge, pedagogical content knowledge, and techniques of instruction. In addition to new and revised coursework in university classes, there will be expanded opportunities to work in mathematics or science in public school internships.

The programs these students follow will vary depending on the courses they have taken previously and the scheduling of additional mathematics or science courses. In a 200-quarter-hour (120-semester-hour) program, courses must be deleted if there is to be time for additional mathematics or science course work. In the revised program, one elective course in humanities, two elective social science courses, and two free electives have been deleted. This provides time for five additional mathematics, science, mathematics education, or science education courses.

In order to select and schedule courses to meet the demands of a more complex program, each student will have two advisors, one in the Elementary Education Department and one in either Science Education or Mathematics Education. The advisor from the subject matter department will be primarily concerned with selection of appropriate courses in the subject matter. As with all students in the elementary program, the education advisor will be concerned with keeping the student on schedule for beginning field experiences and ultimately for graduation.

Georgia expects that the first students will graduate from this program following the winter or spring quarter of 1991. As these students approach graduation Georgia will contact superintendents in the area in which the students wish to teach and inform the superintendents about the program and the qualifications of the graduates. Georgia will assist the students in arranging for interviews. In a preliminary contact with superintendents, Georgia has described the program and asked for expressions of interest.

There will be extensive post-graduation assistance for participants and there will also be follow-up investigation of the effects of the program. In addition to receiving assistance in finding appropriate placement, the graduates of the program will be followed through their third year of teaching. These contacts will provide continued support and information about current developments in their field, encourage and assist graduates in their continued study, and investigate whether graduates will continue to teach and work as specialists. If they leave teaching or are not utilized as specialists, the reasons for these changes should be investigated.

To determine the feasibility of the operation of this program, Georgia notified students in the elementary program of the opportunity for special course work and public experiences in mathematics and science. Twelve students responded to this notification and six are currently in the process of working out special programs of coursework within the elementary program.

To investigate interest on the part of school systems in hiring students who graduate from this program, Georgia surveyed school administrators in the state. The survey included information about the intent of the program and skills Georgia anticipates that their graduates would have. They have received 90 replies from 186 surveys. All replies were positive, requesting further information as the program proceeds and students graduate.

An announcement of this program was sent to all first- and second-year students in the elementary program. The announcement described the intent of the program, the probable benefits, and the probable cost in terms of additional time needed to complete degree requirements. Georgia recruited 12 students. They asked them why they want to specialize in science or mathematics for the young child. The reasons these future teachers gave reflect considerable thought in their choice of career and an excellent grasp of important aspects of education. Here are some of the reasons:

Angela Wilkinson, a first-year student: "When deciding on a major for college I was troubled. I knew that I wanted to teach elementary school, but I also wanted to teach math. This program allows me to do both."

Tamara Black, a first-year student: "I have always enjoyed finding out about the facts in science, but my interest in science stems from the 'whys' behind the facts. Science is a subject that lends itself to this type of exploration . . . I'd like to be able to communicate enthusiasm for the subject of science to my students."

Michelle Lewis, a second-year student: "Mathematics offers a challenge to the students by enabling them to reason out problems on their own."

Donna Williams, a third-year student who intends to pursue the program at the master's degree level: "Project 30 gives me an opportunity to use my interest in science to be specialized in order to benefit young people. I intend to expand my students' knowledge of science through challenge."

Wendy Jeffcoat, a first-year student: "I want to give the children 'hands-on' experience to help them understand how math relates to the real world. This program can teach me to do this."

Stacy Causby, a second-year student: "So many of my friends carried this attitude about math, 'I just can't do it.' I feel like if teachers were able to work with developing positive attitudes at a young level, then a lot of the struggles that occur later on would be eliminated."

Vanderbilt University

In the Spring of 1988, Vanderbilt University had both the need and the encouragement to develop new courses and majors for its elementary teacher education students. The much publicized "crisis" in mathematics and science education influenced several senior faculty and administrators in basic science areas to look for ways to become involved in addressing the scientific needs of the schools and society.

A group of mathematicians, scientists, and mathematics and science educators proposed for Vanderbilt's Project 30 activity the development of new science courses and interdisciplinary science and math/science majors for prospective elementary teachers. These courses were to be linked to the content methods courses offered by mathematics and science education faculty at Peabody, and instructional technology was proposed as one mechanism for integrating content and pedagogy.

By February 1989, Vanderbilt knew that the science project was to be funded. The winning of a $730,000 grant is important campus news, even for an institution such as Vanderbilt that receives substantial funding, and the math/science/teacher education/Project 30/NSF activities began to receive quite a bit of campus publicity. Chancellor Joe B. Wyatt recognized the two NSF grants at the 1989 Faculty Assembly, and teacher education took on a new status as a "rewarded" faculty activity.

Reviewers of the NSF proposal noted the advantage of Project 30 membership as a dissemination mechanism, and Vanderbilt feels that its association with Project 30 contributed to the success of the NSF proposal. Subsequent Project 30 conferences have helped in the dissemination of the NSF products, just as the contacts generated through NSF have helped to publicize Vanderbilt's membership in Project 30.

During the spring and summer of 1989, existing courses or labs in chemistry and physics offered for Arts and Science and Peabody students were redesigned to make them more appropriate for prospective elementary school teachers and interdisciplinary majors in mathematics/science and natural sciences, and new courses were planned. Basic science and science methods faculty from the University and an Advisory Committee consisting of three science teachers from the local schools assisted with the selection of content and activities for the science and science methods courses. In addition to assisting with the course and program planning, Advisory Committee teachers were videotaped teaching "middle school applications" of the content and pedagogy proposed for the college science and science methods courses. (NSF funding provided stipends for the teachers and resources for the video production).

Since the chemistry and physics courses were modifications of existing courses, they did not require formal new-course review by the College of Arts and Science. However, the interdisciplinary majors for prospective elementary teachers did require approval through both the College of Arts and Science (which is to offer the majors) and Peabody (which is responsible for teacher education). Two Project 30 staff members were directly involved with this part of the process: Dr. Sherwood, as chair of the Peabody department that offers elementary certification, and Dr. Holladay, as a member of the Arts and Science Faculty Council. The fact that these majors arose from a joint planning committee (which also had strong support from both deans' offices) undoubtedly contributed to their relatively smooth passage through both approval processes. These majors have now been approved by the Tennessee State Certification Office as meeting new teacher certification guidelines, and they are available for freshmen entering in the Fall of 1990.

Among the changes, Chemistry 101ab has been revised to make it more relevant to the needs of prospective elementary school teachers. During the Summer of 1989, new experiments and demonstrations were designed and tested for use in the course. Prospective teachers enrolled in a special lab section and received resource material showing how the lab experiments could be used as the basis for designing a science unit for elementary school students. The teacher certification students were asked to present a demonstration on the last day of lab. These sessions were videotaped to provide a comparison with later presentations by the students during their practicum and student teaching experiences.

Those students in Physics 110ab and 111a in the Fall semester of 1989 who were planning to be certified teachers (24 in all) were placed in designated laboratory sections. These students were in the same lectures and performed the same laboratory work as all the other students in the course. However, some special things were done with these students:

1. A bibliography of sources on teaching science to children was prepared and distributed to them.
2. For each laboratory meeting (once a week), each student was asked to prepare a project or demonstration that might be appropriate for children at some level in a science module. These activities could be done with the simplest and least expensive of materials available almost everywhere—soda straws, paper clips, rubber bands, Scotch tape, refrigerator magnets, flashlight batteries, etc. The actual lab work was carried out with relatively expensive, precise, commercial equipment, but the idea was to see what could be done with a much more modest budget that may characterize the realities of many school districts. In this way the prospective teachers would have had various experiences to meet the exigencies of a range of circumstances they may face.

Activities for the new biology course will be developed during the Summer of 1990, and the course will be offered for the first time in Spring 1991.

During the 1989-90 school year, project staff were involved in a joint effort with other faculty of the Department of Teaching and Learning at Peabody/Vanderbilt in the development of two new interdisciplinary majors for prospective elementary school teachers.

The Natural Science Studies interdisciplinary major requires a strong foundation in all of the major areas of science taught in the elementary grades: chemistry, physics, biology, and earth/space science. Students must extend this basic knowledge by also taking coursework at the advanced level. It is expected that this science coursework will be supported by basic instruction in mathematics as part of the liberal education core.

The Mathematics and Science Studies interdisciplinary major requires a more extensive study of mathematics including calculus, statistics, and geometry, coupled with basic science courses to provide a foundation in that area also. Advanced coursework in mathematics or science is required in this major as well.

A major goal of the NSF mathematics project was the development of videodisc materials to be used to integrate content and pedagogy in the mathematics methods course for elementary teachers, a goal that was particularly relevant to the Project 30 theme of Pedagogical Content Knowledge. The development of technology for use in instruction was also a goal of the NSF science project, and

Vanderbilt planned to explore the use of technology in the basic science course as well as the science methods course for elementary teachers.

The NSF mathematics project has produced 5 "scratch" (single-copy) videodiscs, each containing 30 minutes of classroom examples of teaching and learning mathematics. Each disc is controlled by a computer program using HyperCard, an authoring system that is provided with the Apple Macintosh personal computer. The HyperCard program, called a "stack," is analogous to a stack of index cards with each card containing information in a variety of forms: pictures, graphics, or text. Any piece of information on a card, such as a word or picture, can connect to information on another card or to an external device such as the videodisc player.

A card showing on the computer screen might, for example, contain a paragraph of text describing a common misconception in science and a small picture of a camera (video icon) that plays a short classroom scene from the videodisc showing the misconception. The user moves a pointer around on the computer screen by rolling the "mouse" and selects an item such as the video icon by pressing the button on the mouse.

Because of the NSF funding, Project 30 team members have had access to graduate students hired to assist with videotaping and programming. Each semester, practicum students enrolled in the science block of methods courses (science, mathematics, and social studies) and some student teachers have been videotaped as they presented mathematics and science lessons. Lessons taught by experienced elementary school teachers who are consultants on the two NSF projects have also been videotaped. Vanderbilt is continuing to develop the mathematics materials. Multiple copies of one of the mathematics prototype videodiscs with HyperCard stack have been produced and are available for purchase, and Vanderbilt is beginning to collect video for use with the science materials. They plan to produce the first science videodisc during the 1990-91 academic year, using the mathematics materials as models. The disc will be designed for presentation purposes and for use in teaching the science methods and science content courses.

Another project for Vanderbilt is The World of Chemistry, a series of twenty-six programs developed for use in an introductory chemistry course for nonscience majors, either in a telecourse format or in a conventional college course. Co-directors of the World of Chemistry project are Dr. Isidore Adler, Department of Chemistry, University of Maryland, and Dr. Nava Ben-Zvi, Department of Chemistry, Hebrew University of Jerusalem. Major funding for the project was provided by Annenberg/CPB Project. Project 30 team member Dr. Joesten is a co-author of the accompanying text for The World of Chemistry videotapes. Dr. Joesten, with the assistance of other NSF project staff, developed a sample HyperCard menu for the disc (on periodicity), and this disc will be used in the lecture section of Chemistry 101a next fall.

The videodisc format will also be used in the special Chemistry 101a lab section for teacher certification candidates using video of classroom applications of the science topics covered in the lab (as described in this section of the report). After students in Chemistry 101a lab have done experiments, and while they are thinking about how the particular experiment can serve as the basis for developing a science unit, they will see and discuss videodisc segments of science units being taught in the classroom.

In August 1989, funds provided by the College of Arts and Science were used to equip the Chemistry 101ab classroom with a video screen projection system (NEC 122OS), videotape player, videodisc player, and wiring for computer hookup to drive the video equipment. Additional equipment, including an LCD panel to display the computer screen, will be purchased for the 1990 Fall semester. The mathematics methods course that was the subject of the first NSF project now meets for roughly one-third of the class sessions in the Peabody computer lab where students have access to the HyperCard stacks during and outside class. These facilities will also be available for the science methods course when the science materials are ready for use.

Because of a growing interest in instructional technology on campus, the Project 30 team elected to spend some of its funds to co-sponsor a workshop on the use of hypermedia technology in instruction. The workshop was fully enrolled (24 participants), with priority given to faculty in mathematics and the sciences from the College of Arts and Science and faculty from Peabody College who work with teacher education. The workshop was held in the Peabody computer lab and was conducted by faculty and staff associated with Peabody's Learning Technology Center. Vanderbilt thinks it is significant that three members of the Chemistry Department went from the hypermedia workshop to a presentation (the following day) during which they used their newly-acquired "expertise" to convince a faculty development funding committee from the College of Arts and Science to buy the new chemistry classroom equipment mentioned in the previous section.

The communication benefits from cross-school activities such as the workshop are hard to quantify. Certainly, the educators came away with a new appreciation for the research scientist's dedication to the improvement of teaching (including willingness to learn from "professional teachers") and the scientists found that the school of education offered a valuable resource in a technical area that was close to their own field of expertise.

Since the activities that were promised in Vanderbilt's original Project 30 proposal are now funded through other sources, the Project 30 team is using the money awarded by Project 30 to fund individual and joint faculty development activities in the areas of mathematics and science education. In addition to the workshop described above, Project 30 funds have been used to send team members to mathematics or science education conferences (conferences that would not be supported through the normal University travel program). Project 30 team members are seeking funds for three other projects related to the fields of mathematics and science. In each of these projects, faculty from both schools are represented.

MINORITY RECRUITMENT

We have examined, in the previous four chapters, various kinds of service efforts by Project 30 schools. This last chapter on service reform by Project 30 schools may be the most important: in it we look at what a number of the schools have done about minority recruitment.

University of Dayton

At the University of Dayton, the Urban Summer Education Program is part of a Project 30 focus and currently consists of a two-week, residential experience for Black high school students who express an interest in teaching and in the University. The program is designed to:

1. orient each participant to the University—its academic programs, faculty, facilities, and resources;
2. orient each participant to the profession of teaching—its roles and responsibilities, career opportunities, high school and college preparation programs, and teaching practices;
3. provide academic, social, and athletic programming;
4. provide a positive, caring, and helpful atmosphere;
5. increase the participants' self-esteem and self-concepts;
6. help students adjust to living away from home, provide opportunities to manage time, and encourage them to make responsible choices;
7. allow students to meet and communicate with various university faculty and administrators;
8. establish mentor-advisee relationships;
9. present the spectrum of university life—classes, dormitory living, meals, and social and activities; and
10. maintain communication during the academic year through special programming on campus, the local FTA clubs, and the mentors.

The program was designed with the help of a School of Education Minority Recruitment Task Force composed of 15 minority teachers, counselors, and administrators from five local school districts that serve minority students. The Task Force began by developing a rationale for the need to recruit minorities for the teaching profession and proceeded to formulate various ways to accomplish this task: a summer program, reconstituted future teacher clubs, fund raising, pre-college programs, mentoring programs, retention programs, and linkages with community colleges, to name a few.

The ideas then underwent a feasibility analysis and some were approved for implementation. One of these was the Urban Summer Education Program. In its first year, applications for the forty positions numbered fifty-one. By the second year, the University received eighty-eight applications for the forty positions. The selection criteria include a minimum cumulative grade-point average of 2.50, a written essay from the prospective student explaining why teaching is a career interest, a commitment to live on campus for two weeks, a written recommendation from the school counselor, and permission from a parent.

The Urban Summer Education Program consists of a two-week residence on campus and a schedule of activities beginning at 7:30 a.m. and ending at 11:00 p.m. During this time the participants take part in planned academic, social, and athletic activities. They also attend such daily courses as orientation to teaching, microcomputer applications, Black literature and poetry, Black history, science experimentation, mathematics, reading and study skills, problem-solving techniques, learning styles, and SAT and ACT guidance. University faculty members including the holder of an endowed chair and a Black poet-in-residence teach these courses. The Program seeks out faculty members genuinely interested in working with the students; in fact, some faculty members request an opportunity to participate.

The high school students learn about the program from articles in the local newspapers, brochures and correspondence sent to the local high schools, school visitations by University representatives, Black ministers in the community, and past participants. Also, the reinstitution of the Future Teachers of America clubs, which the School of Education achieved in various middle and high schools, provides a conduit for communication and encouragement. Potential participants also learn about the program during on-campus "reunions" for past participants and members of the Future Teacher Clubs.

During the 1988-89 academic year, Dayton extended invitations for the following activities: a lecture and discussion with National Education Association President Mary Futrell; a viewing of the movie *Cry Freedom*; a lecture by author Donald Woods; various events commemorating Black History Month; and a meeting and discussion with the dean and selected faculty members of the School of Education. These meetings and activities provided past and future participants a chance to mingle with education faculty and students, and thereby learn about the program and the University from one another.

The Urban Summer Education Program at The University of Dayton begins on a Sunday evening with check-in at the dormitory, a meeting with the program staff, and a reception for participants and parents hosted by the University President, the Provost, the Dean of Education, Minority Student Affairs staff, and selected faculty members. The participants receive an orientation to the program and a schedule of activities, followed by social, "ice-breaking" activities.

Throughout the two-week session, the participants interact with faculty members and administrators. In addition, the Program Director and three assistants live in the dormitory and provide the necessary supervision. To ensure a chance for intensive interaction, the participants must reside as a group in the dormitory. All activities, except the classes, take place among the undergraduate and graduate students on the campus so that each participant will experience what it is like to be part of a university community. Program participants eat with the regular students, take part in the everyday social and athletic activities of the University, reside in a dormitory, and experience much of the normal university life. All expenses incurred by the program—faculty salaries, pay for the director and assistants, advertising, supplies and materials, dormitory and food costs, and social and athletic expenses, including a dance for the participants—are absorbed by the School of Education—a total cost approximating $36,000.

Finally, the participants meet with mentors who help them make the transition to campus life and help reinforce their interest in teaching as a career. The mentors keep the participants from feeling "lost in the bureaucratic shuffle," and they guide the participants to opportunities and resources allocated for minority participants at the University. Furthermore, the mentors help the participants identify the high school courses they need for entry into the University.

With the end of the Program's second year, the School and its Minority Recruitment Task Force were encouraged by the enthusiastic response among the participants. Formal, focused interviews and a questionnaire helped shape modifications and implement new ideas for subsequent years. The number of inquiries has doubled in just two years, and support from past participants has played a large role in generating this interest. A critical aspect of the program has been the participation of elementary and secondary teachers, counselors, and administrators on the Minority Recruitment Task Force. This group spent an entire year developing the program and has remained active in its implementation. Meanwhile, the University continues its financial support, even though extensive additional funding must be acquired in order to expand the program. The staff hopes to double the enrollment each summer to a maximum of 120 participants—forty participants from each of the three high school grade levels. This arrangement would guarantee a steady stream of new and returning students.

The 1990-91 academic year, the first academic year wherein participants will graduate from high school and qualify for entrance to the University, will provide an objective indication of the Program's practical success.

Indiana State University

At Indiana State University the Project 30 team selected minority recruitment into teacher education as one of their primary goals. Though at first they did not feel they were making much progress, they have begun to see important results from their continued efforts. Through a program entitled, "Project EmPOWERment," the School of Education has brought to ISU's campus eighteen Afro-American and hispanic students (junior-high age) from Hammond, Gary, East Chicago, and Terre Haute. This week-long program, which emphasizes work in traditional university disciplines, career planning, team building, and test-taking skills, has brought together students who they hope will become prospective teacher education majors at ISU. Additionally, the State of Indiana now provides scholarships ($1,000 per year, renewable) for minority students in education; these scholarship recipients are paired with School of Education faculty mentors. The number of these scholarship recipients has doubled in the past two years. The program began with ten students and four mentors and this year increased to twenty students with fourteen mentors. Initial student participants demonstrated a strong retention rate as well.

St. Mary's University

At St. Mary's University, in an effort to improve recruitment and retention of minority students in teacher education, the following programs have been implemented:

A. An annual "Teachers' Fair" for high school students. This is conducted on the St. Mary's campus in conjunction with the Future Teachers Clubs in area high schools. It is held on a weekday, (Teachers' Work Day at area high schools) so that the high school students can attend college classes from 8:00 a.m. until 10:00 a.m. The program consists of major speakers addressing the role of "teacher," a panel of university students currently engaged in student-teaching, information from St. Mary's and junior colleges on admission procedures and financial aid packages, free food, prizes, and a dance. It has been very successful.

B. An annual invitation to junior college students interested in teacher education to attend an "information day" at St. Mary's. Admissions and financial aid personnel, faculty members, and the education students (juniors and seniors) are available to discuss the University with visiting students and faculty.

C. In spring 1991, St. Mary's intends to initiate a "Teachers' Fair" for their own St. Mary's students. Their target will be juniors and especially seniors who may want to consider teaching as an alternative or "first" career choice. Alternative certification programs will be an important consideration at this Fair.

D. Proposals have also been submitted for Summer Institutes for high school students and for teachers, but these will require grant funding.

To achieve greater teacher retention, the St. Mary's Team made the following curriculum recommendations for a Mentoring Program for new teachers:

A. Investigate the establishment of a Mentoring Program with specific school districts, involving key master teachers in specific schools as mentors.

B. These teacher-students would be new graduates with teacher certification, and, therefore, would receive full-salaries from the school districts.

C. Teachers would enroll in mentoring programs as their first credit hours toward a Masters in a specific academic program (major/minor teaching field).

D. The Mentoring program would require that a master teacher not only conduct some classroom observation, but also engage in one-on-one counseling.

E. Also mandated would be a minimum of 6 seminar classes per semester at St. Mary's. Here they would meet as a class with the faculty members and school mentors. The seminar would explore classroom problems, teaching methods, and additional content training.

F. Students would earn 3 graduate credit hours for one year's enrollment in the mentoring program and participation in 12-14 seminars within that year.

G. Academic departments should consider graduate-level programs for teachers, perhaps designing these as summer institutes.

H. The need for a second year of mentoring seminars would be determined at the end of the first year.

Bridgewater State College

At Bridgewater State College, a State Higher Education Executive Officers (SHEEO) grant, funded under the Ford Foundation and awarded last year by the Board of Regents of the Commonwealth of Massachusetts to Bridgewater and two nearby community colleges, challenged them to focus on the theme of Recruitment of Minority Teachers. In collaboration with Bristol Community College and Massasoit Community College, a policy was developed that simultaneously admits prospective teacher education students into Bridgewater State College when they matriculate at either of the community colleges. Presently twelve students in the two community colleges and four at Bridgewater are enrolled in the program.

All of these students are eligible for financial aid and scholarships specifically targeted for this population. This past year a $1,000 scholarship was awarded from Bridgewater State College to the first transfer student entering the teacher education program. It should be noted that this scholarship is renewable for a second year and that financial aid is also available to supplement the scholarship. For those students who do not receive a scholarship at the community colleges, financial aid packages are available.

Another important goal of the SHEEO grant is curriculum development and opportunities for field experiences. Faculty from the respective colleges are collaborating on the possibilities of team teaching and/or course transfers, and new ideas are being presented that would not have been possible without the momentum of the grant. A Minorities in Teaching Council, composed of faculty from the three campuses and members of the local communities, has been established to provide input into the program. This Council will also assist the Colleges with recruitment and support services, especially a support network for students. A nearby urban school system, Brockton Public Schools, has been identified as a target school district for minority students, and these high school students will be encouraged to enroll in the Collaborative Teacher Education program at either of the two community colleges or Bridgewater State College.

The SHEEO program, described above, is moving from grant status to full institutionalization and, with continued commitment, should significantly increase enrollment of minorities in teaching. The dialogue with the community colleges in the SHEEO grant will result in collaboration well beyond the scope of the original grant.

Baruch College

Baruch College, with its partners, Intermediate School 70, Mabel Dean Bacon Vocational High School, and Washington Irving High School, and local community organizations and businesses, has designed NEW DIRECTIONS, a program of academic and support services funded by New York State's Liberty Partnership to help students remain in secondary schools and go on to college. The student populations in the three schools are from groups that are underrepresented in the teaching profession.

Through this program, the Project 30 team plans to work with the Baruch Teachers of Tomorrow Club and 12 to 15 ninth and tenth graders who have been identified by the partnership as young people who may become interested in teaching and need mentors and support.

Southern University at New Orleans

Southern University at New Orleans has been working to identify strategies that will increase minority participation in teaching. A postbaccalaureate component was created to provide degreed persons with an alternative to achieving certification in education, both at the elementary as well as the secondary level. In 1988 this component had 67 students enrolled; as of March 1990, almost 200 elementary and 270 secondary postbaccalaureate alternative certification students were enrolled. The second component of the program, still in the planning stages, will address early identification of students who are interested in teaching as a career. In addition, a new position, Coordinator of Teacher Preparation, has been established in the College of Education. One of the responsibilities of this position is to recruit minorities into education, particularly in the areas of science and mathematics.

University of Wisconsin-Milwaukee

At Wisconsin-Milwaukee minority students are being encouraged to participate in the UWM "Professional Pathway" program, which works to facilitate the transition of promising minority undergraduates into the professional schools of Business, Education and Engineering. The students in the program are paired with a university faculty mentor and community mentor within that discipline.

These two mentors work with the student to provide firsthand knowledge of the academic requirements as well as the on-the-job duties and responsibilities faced by the community professional. In addition, students are encouraged to participate in study group sessions, workshops, and other events of special interest within their area of study. These activities serve to further "round out" and motivate the students' involvement.

The School of Education offers its Pathway students contact with a faculty member within the school as well as with a community mentor from the public schools. The students meet with mentors in workshop activities set up by the program to foster contact in a variety of activities in the School of Education and in the public school community. Each semester the students and the mentors are encouraged to develop goals for the students and keep track of their progress. The program also works to prepare the students in meeting entry requirements for the School of Education.

At the time UWM's students are ready for practice teaching the Center for Teacher Education serves a critical role. CTE was established in 1986 to allow a multi-disciplinary group of faculty and school personnel to effect changes in preservice teacher education programs and professional practice in the schools. CTE has been identified as one of 49 areas of special strength at UW institutions by the UW System Board of Regents and has been designated a Center for Excellence. To provide effective, clinical environments for teacher education, four Professional Development Schools were established in January 1988 by the Center and the Milwaukee Public Schools. Criteria for selecting these schools were that they be neighborhood schools rather than specialty or magnet schools; that they embody issues of urban schooling; and that school staffs request to participate in the Pathway program.

University of the Pacific

Offering full financial support and enhanced apprenticeship experiences to 10 to 15 highly qualified minority students in elementary teacher training has been a major element in the University of the Pacific's plan for Project 30. Through the generosity of the Janet Robinson estate, interest on an endowment of $600,000 was made available for this purpose. Combined with other support, this gift makes possible the funding of four years of education for five entering freshmen this fall, and—depending upon circumstances next year—five more next fall.

Finding qualified applicants for Robinson scholarships took a lot of hard work on the part of Project 30 team member Peg Langer, with additional letters and calls from Dean Haisley, but the team is pleased with the recipients and especially gratified that the process stimulated additional freshman minority applications to the School of Education. Approximately a third of next year's freshman class will be minority students, an increase of over 100% from last year! Those not receiving one of the five Robinson scholarships are eligible for other forms of aid. Setting up the scholarships required substantial effort in three areas: deciding who the scholars would be and what they would do, funding the scholarships, and recruiting.

In consultation with teachers and faculty in the partnership, the Project 30 team has designed an apprenticeship program for Robinson scholars that will include a weekly, on-going seminar with the Dean of Education, supervised apprenticeship experiences in each of the three partnership schools, and the option to participate in partnership activities, including dinner-seminars and Project 30 workshops, labs, and collecting trips. The purpose of this apprenticeship is to foster the development of high professional values and commitment to teaching through extended and supportive interaction with experienced and expert teachers.

In the seminar, students will not only discuss current issues in teaching and implications arising from their experiences in the schools, but they will also get special attention for their personal, academic, and professional progress. In the partnership schools, they will observe and aid in classrooms and later work on special projects with partnership administrators and teachers. The team regards this apprenticeship model as a powerful way to bring new students into the profession, giving focus to their entire undergraduate experience.

The Robinson endowment has only been allocated for these scholarships for a limited period of time. If the Robinson scholar program is to continue, additional substantial external funding must be secured. To maintain the program indefinitely at the current level, taking in five new scholars a year, would require raising about $170,000 a year or an endowment of about $2.2 million. This is a daunting task, and given many other pressing needs, the team is exploring all options, including a reduced level of support or termination after the current funds are spent. If the program is very successful in recruiting and inducting minority students into teaching, however—and it will be subjected to careful periodic assessment while it is funded—it may serve to justify similar subsequent efforts at the University of the Pacific or elsewhere.

Recruiting qualified minority applicants proved time-consuming and initially disheartening, although hard work eventually paid off in finding good recipients. The Admissions Office has been cooperative, but identifying Robinson applicants is not high on their agenda. In fact, normal channels of application proved only marginally useful. The team considered recruiting minority transfers from local community colleges, but given other means of support that the university offers these students and several other considerations, the team decided to concentrate on first-year students.

The team also considered recruiting minority aides in local schools—and would have liked very much to proceed in that direction—but found that potential older students required support for families as well as for themselves; financially, it was not feasible for them to attend college full time, and the team felt it was not desirable for the program to feature students who could only attend part time. Successful recruiting required that Professor Langer call high school counselors, personally encourage students to apply for admission, and follow up with more letters and phone calls from Dean Haisley. If the program were to continue, it should have staff support time allocated for recruiting, visiting schools to talk to counselors and students and following up with students and their families.

The University of Pennsylvania

The University of Pennsylvania's new Minority Teacher Education Scholarship Fund provides loan-forgiveness scholarships for minority students who accept teaching positions in urban Philadelphia. This program enables the program to increase its enrollment of minority teaching candidates. Coupled with Penn's efforts to place student teachers with supportive, experienced teachers in urban settings, the loan-forgiveness program helps to attract and retain talented minority students in teacher education and promotes multicultural awareness.

In addition a steering committee of experienced teachers, teacher educators, and fieldwork supervisors now meets regularly to design special sessions on diversity and multicultural teaching that supplement the rest of the program. These programs include special speakers, presentations by urban teachers and community members, as well as opportunities for group members to interact with one another.

San Diego State University

Project 30's themes of international and multi-cultural challenges and developing strategies to increase minority participation in teaching were addressed in several programs at San Diego State University. Their Touch the Future: Be a Teacher campaign and Future Teacher Clubs at high schools with high ethnic enrollments focused on recruiting and retaining students from underrepresented groups. Dean Ann Morey of the College of Education had offered leadership in obtaining a C.S.U. Teacher Diversity Grant that supported planning and implementation for programs and outreach activities to attract multicultural teachers. There has been a joint effort by the directors of the bilingual credential program and the School of Teacher Education to encourage incoming freshmen and sophomores to consider a teaching career. Finally, the College of Education established an Ethnic Student Recruitment Committee in 1988.

Pembroke State University

Evolving from a normal school for the Indians of Robeson County, Pembroke State University has graduated many minority teachers who have been and are employed in area schools. Participation in Project 30 has heightened awareness of the need to recruit and retain more minorities in Pembroke's teacher education programs. Members of the Project 30 Team gathered statistical data on minority enrollment in teacher education as compared to overall minority enrollment at the university over the past several years and shared this with members of the Teacher Education Committee. Formal and informal discussions on possible strategies to increase minority enrollment were held with faculty, representatives of the state department, members of the community, and colleagues at other institutions. Information on what other institutions have done was gathered and a member of the Project 30 Team attended a national seminar on summer institutes for prospective teachers.

Many strategies have been identified and there is tremendous interest in implementing a program that would include summer institutes for minority high school students considering teaching careers, a support system involving university faculty and minority teachers from area schools as mentors, interdisciplinary seminars, and special enrichment activities to foster the retention in and completion of teacher education programs by minority students. At this time, several faculty members have identified a possible means of securing funding for such a program from the local community and are beginning to pursue this avenue.

The increased awareness of the need for more minority teachers generated by participation in Project 30 contributed to Pembroke's eager acceptance of an invitation to participate in a state-wide consortium designed to increase the supply of minority teachers. Three members of the Project 30 Team have agreed to serve on the campus advisory committee for this program.

Weber State University

Although faculty at Weber State University have been very interested in minority recruitment and preparation in teacher education, Project 30 gave them another impetus to move along more rapidly on this matter. A minority recruitment committee was organized and plans were made to recruit more minority students to teacher education from the local area and also from other states. It was felt that the teacher education program could keep students in the program once they were initially attracted to the teaching profession. Plans have been formulated to begin to attract students to the profession at a much earlier age than that at which Weber State had previously been able to get them involved. This proposed early recruitment would begin with students in grades four through nine.

Section Three

LIMITATIONS AND POSSIBILITIES

LIMITATIONS AND RECOMMENDATIONS

While criticisms of education reform efforts may, at first, not seem extremely productive, understanding the very real limitations, constraints, and politics of reform are essential to its progress. With that in mind, a number of schools had problems they wanted to communicate and recommendations for the future.

University of the Pacific

The University of the Pacific Project 30 team expressed a number of concerns about their participation in Project 30. They point out, for instance, that partnerships like theirs (see chapter four) need money, if just for hospitality and a limited range of start-up activities. Modest funding from the Project 30 grant was extended by the university's absorbing major personnel costs, but some activities simply need hard cash. The Project 30 team spent over $3,000 for partnership dinner seminars in the past year; expenses for laboratory workshops and collecting trips were absorbed by the departments or paid for by participants. It is not clear what will happen next year without at least modest additional external funding. More ambitious collaborative efforts that require substantial commitments of time from teachers and professors are not feasible without external support for substitute teachers, released time for faculty, and so forth. During the past year, the team has submitted three major funding requests to federal agencies without success; however, attempts will continue to secure support for the partnership's identified priorities.

Pacific also points out that partnerships need clear and visible administrative backing to enlist hard-working arts and sciences faculty and elementary teachers in the first place and strong and imaginative leadership to continue to interest them. Project 30 at the university has been fortunate on all counts. Senior faculty participation has been especially strong; the quality of participating school teachers is frequently mentioned as an important factor in participants' wanting to continue the partnership. Developing trust and respect has been an important dimension of the experience. The team discovered it was helpful to draw on prior personal relationships at the beginning.

Prior relationships between arts and sciences faculty and education faculty, however, raised a delicate question: if the partnership is perceived as a School of Education venture, would arts and sciences faculty participate? In this instance, for better or worse, the answer was no. Acknowledging this, the team emphasized the person-to-person recruitment of arts and sciences faculty, but also invited members of the curriculum and instruction faculty to participate. The result was a happy mix, with a clear preponderance of arts and science professors. Participating teachers, many of whom already had professional relationships with education faculty, have found this aspect of the partnership novel and attractive.

Above all, Pacific would like to point out that *significant reform is hard work.* Making a university/schools partnership work so that all the partners perceive the benefit and helping it to evolve appropriately takes commitment, time, effort, and imagination—especially a large amount of the latter. Recruiting additional minority students into teaching is surprisingly difficult. Writing a program that can reasonably make any claim whatsoever to adequately train elementary teachers in the subjects that they need to teach is a veritable black hole of time, effort, and spirit, from which the principal representatives of Pacific's Project 30 team have now retired—bruised, shaken, and mildly triumphant.

Vassar College

Project 30 was also costly to Vassar. They question whether the outcomes will gain sufficient national attention if presented in a book-print format as yet another "national report." Their campus process built on already existing close collegial relationships. Before higher education institutions really take the issue of teacher education seriously, they must see a gain. If the gain is not large federal grants or foundation grants, then it must be in the amount of publicity and good will that can be achieved by emphasizing teacher education. To allocate already strained budget resources, and faculty resources, in a time of shrinking enrollment is just not realistic, says Vassar. They add that New York is constantly tightening the certification codes, making it harder and harder for liberal arts colleges to continue to prepare teachers. The Project 30 participation did help, but these greater pressures will, in the long run, decide the future of teacher education at Vassar.

One insight Vassar gained from Project 30 was the value of collaboration between institutions. The future of teacher education at Vassar may, in the long run, be based upon linking up with other schools, especially those with graduate programs, and developing programs bridging between the schools. It is certainly true that Project 30 reemphasized to the Vassar administration the importance of total institution support for the preparation of teachers. The good will is there, but the resources are limited.

One of the most significant lessons Vassar learned from participation in Project 30 is the great differences that exist among the 30 participating institutions. Vassar found that it took a full year to understand the point of view of their colleagues at other schools. It might be beneficial, they feel, to continue Project 30 by attempting to establish consortium relationships nationally, based on criteria of similarity between programs.

It may evolve that several schools come out of this project with similar changes and program designs. Vassar believes that it would be good to establish ways for those schools to link up, perhaps via computer access. This would enable those with similar interests to continue to talk and share.

Vassar believes that follow-up information detailing the politics of change on each campus should be prepared. This would be a valuable guide, not only for Project 30 schools, but others as well.

Finally, Vassar urges that some way should be found to creatively get the message of Project 30 before a national audience, but feels that another book or report won't do it. Perhaps a teleconference, a series of computer disks, or a team of panelists who travel to a number of national meetings, both educational and citizen groups, could help achieve this goal.

Santa Clara University

Santa Clara University also had some recommendations. In retrospect, they felt a useful activity for Project 30 might be small group, regional, or "theme-alike" meetings for Project 30 schools. While they learned a great deal about ways of collaborating on their own campus, they felt that they may also have benefitted from sharing more closely and more often with neighboring Project 30 schools.

University of Maryland at College Park

Members of the University of Maryland's team felt their project has demonstrated that small-budget activities can be fruitful, given the existence of certain conditions. Among these, the interest in and support for the activity by deans and faculty is essential. The two deans involved originally in the project believed that efforts to improve college and pre-college teaching were needed and important. They also were willing to allocate scarce resources to supplement the small amount of funding available from Project 30. The cost of attendance at the first annual meeting in Houston far exceeded the total of the Project 30 award, and other funding was made available to support Maryland's project. Without this type of moral and financial support from the deans, the project would have been significantly less successful.

Of even greater importance was the willingness of three highly competent and exceptionally busy faculty members to use their time and creative energy to conceptualize and carry out Maryland's plan. Given the lack of specific incentives to entice their participation, Maryland is fortunate that the intellectual challenge appealed to their commitment to improve the quality of undergraduate teaching at this institution.

Although universities are dynamic and ever changing institutions, Project 30 spanned a time frame during which Maryland was changing leadership at the campus level and within the units involved in the project. In addition, the university system was undergoing an organizational change and the campus was implementing a series of major changes in its undergraduate requirements. The net result of these factors was additional time requirements for faculty—to revise policies to reflect system requirements, to meet with representatives from other campuses, to create new courses, to revise graduation requirements, etc. In addition to normal responsibilities, much time was required to adjust to the changes being made. As noted earlier, events affecting the institution were both friend and foe for Maryland's project. To complicate matters, the university faced serious financial constraints as a result of a lagging state economy. The financial situation made it impossible to implement an interdisciplinary capstone course developed as part of the Project 30 activity.

These reflections describe real factors impinging on the success of projects such as Project 30 at an institution such as Maryland. The positive aspects of Project 30 for Maryland include:

1. The conceptualization of the project was intellectually sound and appealing to faculty and administrators committed to improving undergraduate instruction;
2. The process enhanced inter-college relationships;
3. The annual meeting provided an opportunity for cross-institutional sharing and exposure to national leaders in teacher education reform;
4. Project 30 challenged institutions to develop a project appropriate to specific needs of the institution;
5. The project stimulated an activity that has the potential of lasting influence on programs on the campus; and,
6. An interdisciplinary course was designed as a capstone experience for science students.

POSSIBILITIES FOR CHANGE

As the Maryland team points out (see chapter nine) Project 30 challenged institutions to develop a project appropriate to the specific needs and strengths of the institution. When schools engage in educational reform that is tailored to the their distinctive characteristics, they extend our sense of the possibilities of reform. Perhaps a different kind of reform is possible for every different kind of school, each with its own problems, its own qualities, its own strengths. With this in mind, the last chapter of this report looks at the teams who most adapted Project 30's goals to the specific character of their schools.

St. Mary's University

Geographic location can create possibilities for reform. St. Mary's, which is close to the Mexican border, designed an international experience for prospective teachers: a semester in Queretaro, Mexico. The program will be established in cooperation with the Alexander von Humboldt Institute, headed by Dr. Detlev Kapstein. Participants will include 12 to 15 students contemplating careers in teaching at the elementary and secondary school level and a faculty member from any of the undergraduate schools of the university. The purpose of the program is to permit the prospective teachers to live in an international setting and to experience an observation practicum under the tutelage of non-American teachers. The experience will assist the student to more realistically make a choice of career prior to making a commitment. In addition, for all students this will be an enriching educational experience.

Students and their accompanying teacher will spend one academic semester in Queretaro, Mexico. A St. Mary's teacher will be the University's liaison with Dr. Kapstein and will teach two courses in his/her discipline in English. Both of these courses will be from the core curriculum. In addition, students will take two courses from non-American teachers. One of the two will be a foreign language course, again to fulfill a core requirement; the other course will be one of the following: Mexican History, Mexican Culture and Civilization, Mexican Literature, Geology, Art, Music, English, German, or Physical Education. The fifth course will be an observation practicum under the tutelage of one of the teachers of the institute. A sixth course could be offered, if desired.

Santa Clara University

Because of the increasing ethnic diversity in California, Santa Clara wanted to improve multicultural awareness at the university and engaged in a variety of activities for this purpose. During their first year, the Project 30 team at Santa Clara laid the groundwork for integrating a multicultural perspective into three courses required in the pre-teaching curriculum: Writing for Teachers, 20th Century U.S. History, and Ethics in Society. Members of the Ethnic Studies faculty, the faculty teaching the specific courses, two master teachers from local school districts, and the Project 30 team members participated in a series of informal meetings and a structured professional development activity. To plan the professional development activity, the team held several meetings with public school teachers and meetings with Santa Clara University faculty to determine their interest and to solicit their involvement in a collaborative effort that might result in some improvements in SCU courses.

These meetings resulted in a faculty development/inservice activity for English teachers entitled, "Curriculum Dialogue." In April 1989, seven English teachers from local schools, four SCU English professors and the Director of SCU's Teaching and Learning Center attended this two-hour session. This faculty development/inservice program was a very successful event, with lively discussion addressing concerns about teaching English at all levels.

The Project 30 team members were also involved with another kind of curriculum discussion when Henry Giroux gave the Presidential Lecture in May of 1989. Santa Clara invited the teachers who participated in the Curriculum Dialogue to attend Professor Giroux's lecture. Some of these teachers participated in a special workshop with Henry Giroux, where the focus was on educating minority students and global issues in the curriculum. The Project 30 team saw this as an excellent opportunity to bring a radical critique into their discussion of teacher education.

In January, the Project 30 team and invited faculty and public school teachers and administrators participated in a California Department of Education sponsored conference on "Cultural Diversity." This was a working conference in which each team was asked to plan strategies for increasing awareness of and information about California's increasingly diverse student population.

In May 1990, Project 30 sponsored a dinner, lecture and workshop with Professor James Gee of the University of Southern California, who spoke on the topic, "The Problem of School Failure." This lecture was an opportunity for SCU students, faculty, local teachers, and project team members to participate in intellectual sharing and dialogue. The following morning, a small group of faculty, local teachers, students and team members attended a breakfast meeting with Professor Gee to talk about issues concerning teaching and schooling. This collaboration of university and local school people underscores Project 30's role in improving dialogue on many levels.

The Project's emphasis on multicultural, international and other human perspectives has helped SCU's Teacher Education Program formulate two new courses for teacher credential candidates. Beginning in the 1990-91 academic year each credential candidate will participate in a cultural immersion experience in which he or she will have the opportunity to serve in a local human service agency (e.g. homeless shelter, drop-out prevention program, soup kitchen, senior center, etc.). This one-week, intense immersion will help SCU's students to understand that teaching requires service and in order to serve one must be willing to learn from those one serves. In addition, each student will take a course in English as a Second Language Theory and Methods.

The increasing linguistic diversity of California's public school students means that every teacher will someday encounter students for whom English is a second language. The need for teachers who are prepared to meet these students' needs is already apparent. Santa Clara's Teacher Education Program has made a proactive move in institutionalizing English as a Second Language instruction for all students. They believe this will add to the demand for their students who typically seek employment in the Santa Clara Valley, a linguistically diverse area.

Howard University

Howard University, capitalizing on its strengths as an historically black school, undertook a number of activities with the intention of raising awareness of and attention to minority concerns in educational reform. Team members participated with the students and teacher education students at Howard on a panel discussion entitled "The Importance of Minority Teachers." The team also sponsored the group at the national conference, "One Third of a Nation: Priorities for the Year 2000," which Howard held in November 1989.

A number of teacher education students and magnet school students, who met last year at a Project 30 mini-conference and decided to form an organization, met again to create an agenda for future activities on campus and throughout the city. During the remainder of the semester, the group visited elementary and secondary schools to encourage students to consider teaching, targeting minority students. They also devised and implemented their own recruitment program.

A teacher education student from Howard and the Project 30 team leader took part in a minority teacher recruitment television program produced by the Medill News Service on November 2. The reporter interviewed a Project 30 representative and the student. She then followed the student into the student teaching situation and recorded her interacting with children in the elementary classroom. The feature aired in Chicago and was used as "Show and Tell" at the senior reception held at the end of student teaching at Howard for senior students and their master teachers.

At the Monterey Conference sponsored by Project 30 in December, the team presented two slide tape presentations, one as summary of its activities shown at the poster session, and the other as part of the program session on minority recruitment issues. On the recruitment tape, minority students spoke emotionally and candidly about the educational experiences that prompted them to prepare to teach and apparently shocked some of the conference participants, who were speechless at the conclusion. The tape, however, generated lively discussion on this critical issue after they recovered. A copy of the tape was provided to Project 30 Directors.

Three Project 30 team members participated in the National Conference held at Howard, "One Third of a Nation: Priorities for the Year 2000," making presentations and facilitating discussion in sessions relating to education reform priorities for minorities. The Project 30 team played a leadership role in selecting speakers for the conference and inviting colleagues from the College of Liberal Arts to react to the papers that were presented.

In addition, the team was instrumental in making sure that classroom teachers and teacher education students played active roles in the conference, not only participating in the sessions themselves as presenters, but also hosting keynote speakers, attending receptions, and assisting at the registration desk. The idea was to arrange experiences that demonstrated some of the dynamic facets of teaching, including a forum to express and share ideas with experts in education and leaders of both national and local influence.

Howard also put a great deal of energy into a symposium with Vassar. In preparation for the Vassar trip, the students, who were selected from early childhood, elementary and secondary Introduction to Teacher Education classes, read articles, attended the "One Third of a Nation Conference" and generated issues they felt were germane to multicultural education. In the process of refining their issues, the group made a videotape describing events in their lives that have led them to pursue teaching. This tape will be used to further Project 30 efforts both in recruitment and multicultural education. Already, senior teacher education students have taken the video tape to schools when conducting a recruiting program this past spring.

In addition to the formal schedule of conference events, the Howard and Vassar students ate and caucused together over the two-day period. They socialized and participated in heated debates. The final formal event, the student panel, "What to Include in a Multicultural Classroom," was planned and executed by the two groups, which had coalesced into one around this issue. They asked that none of the instructors speak, rather that they be allowed to conduct the panel as they wished. It was most exciting. The students were open in expressing themselves through their concerns abut multicultural differences, what should be taught, by whom, and how they could prepare themselves to teach in such environments. One of the students, Nasaria Suckoo, a theatre education major at Howard, read the written comments for the Howard contingency and summarized the experience in the following way:

> On a warm spring afternoon, April 5, 1990, they rolled off the campus of a predominantly Black university to travel over 450 miles to Vassar College, Poughkeepsie, New York. There were 23 Howard students and four faculty traveling to take part in a 2-day symposium entitled "Multicultural Education and Our Schools: An Exploration of the Issues." They would be staying with host students from Vassar and will return the favor when Vassar students visit the Howard University campus in the fall of 1990.

> As they boarded the bus, their clothes, luggage and other belongings whispered secrets of the "trail-mix" of unique personalities that that bus would be shaking and jogging all the way to the New York countryside. Their excitement was apparent as millions of questions and comments about their expectations ricocheted from the front to the back of the bus.

The two lecture days were packed tightly with events, but the one event that stood out from the rest was an emotional lecture on "TransAfrican Art" by Dr. Jeff Donaldson, Associate Dean, College of Fine Arts, Howard University. He highlighted the influences of African art and culture on the art of foreign societies. Unlike any other lecture at the event, his strong belief and obvious effort to control his anger as he spoke of the attempts that the dominating culture makes to discredit African influence on great art of the world grabbed the audience. A cheer of great pride arose from the Howard students as Vassar students sat in awe of the things they had just learned.

In retrospect, the Howard students thoroughly enjoyed the trip and came away with many different impressions on how they thought they had performed and what they felt had been accomplished. Hugh Floyd said "I also enjoyed the Latino dinner given by the Dean of Student Life, James Montoya, Vassar College. He conducted an interesting discussion about what we call our race and what they call themselves." According to Nasaria Suckoo from Howard, she learned that

> a multicultural education is not a new subject to add to the list of information that today's children have to learn, but rather, it is a method through which to teach subjects and foster cultural respect. Multicultural education should never be presented as a deviation from a perceived norm as that fosters superiority and inferiority complexes in young students.

On the other hand, Natalie Henson, another Howard student, felt that "more materials of greater detail would be dealt with" and instead found that, "discussions were rather general with much being said that was already known to us (Howard students) prior to the trip."

It was quite evident that this trip was a success. According to Jullian Fuller, a Howard participant, "We went to Vassar, spoke our piece, and left them with the knowledge that they had been in the presence of 23 prepared and intelligent Black people from Howard."

The Vassar and Howard University teams are in the process of writing up the Vassar experience from the perspective of students and faculty at both institution who attended the meeting. They intend to publish outcomes and impressions of the experience, which once carefully analyzed, may form the basis of a multicultural model worthy of use at other institutions. Continuation of Project 3 will facilitate this process.

Howard also participated in The Teachers College Conference, which was held in Wilmington, Delaware, and included two members of the Project 30 team, and involved Frank Murray, who was an outstanding host and participant. The purpose of this two-day seminar was to create a pipeline of resources for recruiting minorities into teaching by bringing together those institutional representatives who were successful in recruiting and retaining minorities and those who have not been successful so they could learn. The Howard University team helped plan the conference and select participants.

The team was, thus, able to identify as "experts," practitioners, not theoreticians, to provide suggestions to those in the Northeast region who wished to recruit minorities and needed direction. It was the team's association with Project 30 that enabled it to function quickly, identifying experts and those who needed help, as some of the experts and the needy were from Project 30 institutions.

Entitled "Minority Research Recruitment, Preparation, and Retention: What Works," the program attracted individuals who were eager to enhance the academic preparation and certification of minorities entering the teaching profession. In addition to 16 excellent presentations and papers, those present established associations and have agreed to continue meeting regularly.

University of Pennsylvania

At the University of Pennsylvania, a major research institution, the Project 30 team has been part of a larger effort to reorganize undergraduate and graduate programs in teacher education so that teacher research is a central activity. Teacher-research is part of a growing professionalization movement nationwide that encourages teachers' participation in classroom and school-wide research. The movement is directly in keeping with current educational reform agendas that demand more autonomous and accountable teachers prepared to be leaders in their own classrooms, schools and broader educational communities.

Teacher-researchers generate questions about teaching and learning, design and carry out studies in their own classrooms, reflect on what they have learned, and share their knowledge with others. Teachers who view themselves as learners and researchers often alter their roles in classrooms in fundamental ways. When teachers are also researchers with opportunities to share their questions and observations with others, they attend more carefully to the needs and interests of the individuals in their classrooms, they become more active professionally, and they often find ways to link their curricula with community needs and resources.

In Penn's teacher programs, experienced teachers, student teachers and teacher educators are all urged to view themselves as researchers and reformers. When they do so, their pedagogy becomes learner-centered in two ways: teachers function as curriculum creators and not just implementors, and their students are taught how to take more responsibility for their own learning.

Over the course of the student-teaching year, Penn teacher education students now complete four kinds of teacher-research projects: journals, essays, oral inquiry processes, and classroom studies. In journals, student teachers keep weekly accounts of their observations and reflections, which are responded to by their school mentors, their university mentors, and, in some cases, by both of these. These journals are used to enhance student teachers' observation skills, provide data for research projects, and suggest topics for further research.

In addition, student teachers, cooperating teachers, Penn supervisors and other teacher educators write essays, some collaboratively and some individually, in which they pull together theories and readings from courses and seminars and from their own experiences in the public schools. Some essays are shared in weekly and monthly meetings, and some are presented in larger conferences. All student teachers conduct small-scale classroom studies in cooperation with their mentor teachers. These range widely from case studies of individual students and surveys of experienced teacher practices to implementation of thematic literature and social studies units. In addition, a number of cooperating teachers who are experienced teacher-researchers present their own classroom studies to the large group during monthly seminars and in some cases in larger regional contexts.

The new arrangements at Penn, supported by Project 30 as well as by several other national and regional initiatives, also provide opportunities for student teachers to participate with experienced teachers in classroom research by bringing Philadelphia area teachers and student teachers together to consider issues of teaching, learning and schooling. Teacher-researcher contexts provide opportunities for all teachers, experienced and new, to examine and critique their knowledge of both pedagogy and content.

Teacher-researcher groups composed of 3-4 student teachers assigned to the same school, their cooperating teachers at that school, and one Penn teacher educator meet weekly at the school site to reflect, read and write about issues of theory and practice. Unlike the role of the traditional student teaching "supervisor," who observes and evaluates the student's performance in the classroom, Penn teacher educators facilitate meetings of teacher-researcher groups, spending about a day per week at the school site.

Participants conduct joint classroom inquiry projects based on their observations of students and classroom events; write in weekly dialogue journals aimed at helping student teachers understand the culture of the classroom and the school; and confer about student teachers' progress by sharing observational notes, reflections on practice, and written lesson plans. Weekly group meetings provide structures within the school day and on the school site where new teachers can examine their teaching experiences in relation to the perspectives of both classroom teachers and teacher educators.

Teacher-researcher groups across school sites also meet monthly for university-site seminars. In these, they examine issues of urban and minority teaching and student teaching across grade levels, subject matter disciplines, and school sites.

They compare the perspectives of university-based teacher educators with those of experienced urban and suburban teachers by responding to taped classroom interactions, reading from teachers' journals and inquiries, and responding to student teachers' questions, and they critique and redesign features of the student teaching model itself.

In this way, the teacher education model is open to the scrutiny of participants in much the same way as the model of reflective teaching espoused by the program. Collaborative activities that involve teachers in planning, problem solving and cross-school collaboration are expected to diminish teacher isolation and contribute significantly to career satisfaction.

Teacher educators at Penn now regularly present their work at national conferences, including the American Educational Research Association (AERA), the National Council of Teachers of English (NCTE), the American Association of Colleges of Teacher Education (AACTE), the International Reading Association (IRA), and the Ethnography and Education Forum. Writing in collaboration with teachers, student teachers and supervisors, they co-author papers about the activities of Penn's new teacher education programs. In addition, experienced teachers, student teachers, and supervisors present and publish papers at these and local forums.

All of Penn's activities are intended to address traditional problems in teacher education: the gap between university preparation and practical experience in the field, the limitations of ongoing professional education of teachers, and a lack of rich knowledge about successful preservice initiatives. Penn's programs address these problems by linking theory and practice, promoting analysis and critique of current procedures, building a community of fellow learners, and creating collaborative contexts in which new knowledge about teaching and learning can be generated, critiqued and disseminated.

University of Dayton

At the University of Dayton, a Catholic University concerned with instilling values and providing students with a well-rounded education, the Project 30 team did most of its work in the area of general and liberal knowledge. Even though part of what was accomplished programmatically originated in the College of Arts and Sciences and pre-dates Project 30, the Carnegie program generated substantial additional commitment to the notion of bringing together selected School of Education and Arts and Sciences CORE faculty. Described below are the CORE program and elementary BLOCK program. The latter is a newly created part of the elementary curriculum.

The University of Dayton's CORE general education program is designed around the theme of "Pluralism and Values." The program consists of ten integrated courses spread out over the undergraduate years. The first year focuses on the historical, philosophical, theological, and literary development of pluralism. The second year centers on contemporary expressions of pluralism and the problematic nature of values in a pluralistic society. For instance, students study *Habits of the Heart* in a sociology course on "Community." They read *Death of a Salesman* in an English course. They reflect on modern theories of freedom in a social philosophy course.

Faculty teaching these courses share their interpretations with each other and their students, plan joint assignments, and in various ways build on each others' courses to challenge students to critically reflect upon their fundamental values, rights, and responsibilities in a pluralistic democracy. Subsequently, students are required to take capstone courses designed to enable them to go one step further in their reflection. They are challenged to articulate their own philosophical and religious assumptions and fundamental decisions relative to the most significant issues facing contemporary humankind.

Teacher education students who are participating in the CORE general education program take professional education courses that are integrated with and build upon the general education courses. During the first semester of the first year, students take a no-credit course called "Personal Aspects of Teaching," in which they are oriented to the theme of the teacher education program, entitled "Teachers as Decision Makers in a Pluralistic Democracy." They hear about the way in which the program is integrated with the general education courses. Through various activities they learn about the resources of the University, the School of Education, and the Department of Teacher Education. They meet practicing and retired teachers to discuss key decisions teachers make about their profession.

During the second semester of the first year, students take a course called "The Profession of Teaching." The course uses the concept of culture as its central focus. It examines the pluralistic nature of American society as it affects students and the "culture of the school." And it analyzes the concept of professionalism as it relates to pluralism and teaching. In conjunction with this course, students articulate ideas they have learned in weekly field-based experiences in the Dayton Public Schools. They are required to participate in focused observations on the "cultures" of the school, the students, and the teachers, and to work with the cooperating teachers and the elementary or middle-school students.

During the sophomore year, students take such courses as the History of Education, Child and Adolescent Growth and Development, and Teaching and Learning. These courses also are designed to be integrated with the general education courses around the program theme. For instance, students in the History of Education course compare and contrast concepts from the Sociology course on Community with those of significant educators (e.g., Jane Addams at Hull House). Students in the Teaching and Learning course analyze characters in their literature courses from the standpoint of learning theory (e.g., How would B. F. Skinner or Jerome Bruner explain Antigone's decisions and her relationship with Creon?). Appropriate field-based and clinical experiences are integrated with these courses also.

During their junior year, students take methodology courses in which they are challenged to develop mechanisms for creating teaching units that reflect the kind of integration they have experienced in their general and professional education courses. The capstone course is Philosophy of Education, which is taken in the senior year. Its focus is the theme of the program and students are expected to develop and defend their personal statements of what it means to be a teacher in a pluralistic democracy.

In this capstone course, students not only read John Dewey, Henry Giroux, Paulo Friere, and other philosophers of education, they also use individually developed portfolios as a text. The students create portfolios starting in their first year in the program. These portfolios are designed as a mechanism to facilitate the students' understanding of the integration of their courses and to foster reflection upon the theme of the program.

Students are asked to organize their portfolios into five categories that correspond to Lee Shulman's conception of the knowledge teachers should possess: content mastery, content specific pedagogy, student specific pedagogy, classroom management and organization, and teacher responsibility. During their undergraduate years, students are requested to place entries in the portfolios that they think demonstrate their performance in these categories and their reflections. Faculty advisors work with students in preparing their portfolios. The last entry in the portfolio is the final paper required as part of the Philosophy of Education course.

In the teacher education curriculum, there has been an attempt to organize the professional knowledge component in a manner similar to that of the CORE program. Through the BLOCK program, the elementary curriculum has been restructured to enhance curricular connectedness and cohesiveness. Prior to 1987, students completed a combination of professional education courses in a relatively random fashion. There was substantial and needless conceptual overlap in the classes. Instructors were responsible for their own courses and few saw any need to identify how coursework connected with the ideas of faculty colleagues.

A new curriculum was developed by the elementary education faculty that collapsed all methods courses into one BLOCK of courses taken in the second semester of the junior year. As a result, methods courses in math, science, reading, social studies, art, and music courses are taken concurrently. Students split their time between campus-based university coursework and school-based teaching.

While in the schools, they must teach a select number of lessons from a small range of lesson types. Students learn a smaller number of skills than they did in the previous curriculum (e.g., they learn just one lesson design model), but they spend more time testing the ideas they learn and they engage in more reflectivity vis-a-vis the strengths and weaknesses of acquired pedagogical skills.

The notion behind the BLOCK concept was to emphasize depth, not breadth, and to encourage faculty to engage in joint planning and advising with students. Each student in the BLOCK (approximately 50 per semester) has individual conferences with course instructors and is observed teaching a select number of lessons by faculty and three specially trained observers who have no BLOCK teaching responsibilities but who carefully assess the students' performance in the field setting.

Of particular interest was the methods faculty members' interest in eliminating coursework that did not contribute to the intellectual growth of the students. A primary example was the creation by the faculty of a new art and music (aesthetics) course to replace the two separate art materials and music methods classes. The music class was of particular concern to students and faculty. Students learned to play piano and other musical instruments in preparation for teaching an elementary class. Students viewed the class as "soft." For many students it was a course that epitomized traditional conceptions of a "Mickey Mouse" education curriculum.

Working with the art and music faculty, the old courses were eliminated and a new "Music and Art in the Elementary School" course was designed. The new course emphasizes the interdisciplinary nature of the arts and focuses on how the arts can be infused in the regular curriculum (e.g., social studies, English, etc.). The course is team-taught by music and art faculty, and students spend much more time on the identification and application of pedagogical theories from art and music education and much less time on performance and technique.

Creation of the BLOCK enabled faculty to build a more coherent and rigorous curriculum and resulted in the elimination of some education coursework. The elimination of such coursework made it possible to require more study for elementary education students in the arts and sciences.

The CORE curriculum described above is currently available to a limited number of education students, although the University would like to offer it on a broader scale. Though the School of Education has established no specific percentage of the students to matriculate through CORE, the teacher education program for elementary preservice teachers will be strengthened if at least half of the students (and particularly those seeking to teach at the intermediate grade levels) complete general education coursework as part of CORE.

Students who are not part of CORE will be exposed to a new humanities-based general education program, currently in the planning stages. This program, which has been designed under the leadership of two of the Project 30 team members, emphasizes the humanities as the essential link between general and professional education in the comprehensive university.

The comprehensive university often has difficulty implementing policies and programs that support integration. If general and professional education are united in theory, often they are not united in practice. For example, humanities courses are typically pitted against the requirements of preprofessional and professional programs mandated by professional accreditation agencies. Non-humanities faculty typically do not understand the relationship of the humanities to their own purposes, and students perceive them as mere requirements they have to take.

Even worse, the humanities atrophy when humanities faculty themselves fail to relate course content to fundamental questions about the human condition and to communicate with each other about the nature and significance of their work. Such specialization and fragmentation estranges the humanities faculty from colleagues in the sciences and the professional schools.

The question for any comprehensive university (and particularly for The University of Dayton) is where to begin to enhance the humanities. The strategy underlying the newly designed program at Dayton is to begin with the humanities base of general education. This strategy rests on the following premises:

1. The humanities will be respected by both humanities and non-humanities faculty to the extent that the initial humanities courses in a student's undergraduate program are powerful experiences that promote understanding and sensitivity as a basis for critical and creative thinking and further study in a major or professional field.
2. The humanities base courses will be powerful experiences to the extent that the courses are integrated in terms of content (e.g., philosophical thought and historical developments) and cognitive skills (e.g., thinking metaphorically in philosophy and English Composition, or presenting an argument in history about the validity of a novelist's consideration of an historical event).
3. Humanities faculty will value the initial humanities courses to the extent that they perceive them as a significant part of a student's undergraduate experience and as an opportunity to learn with their colleagues about their content and teaching methodology.
4. Faculty development and curriculum development are coterminous activities when done properly. Hence, when humanities faculty work to develop a new curriculum, especially an integrated curriculum, they can develop both as teachers and scholars.
5. Non-humanities faculty will support the value of the humanities to the extent that they participate with humanities faculty in reflecting on the nature of the humanities and general education, and on the insights the humanities can offer for their teaching and study in their disciplines or professional fields.

The valuable lessons of Project 30 have led the University of Dayton to adopt the strategy and five premises identified above as the basis for the content and activities of a new humanities-based project that will influence the general education curriculum of all undergraduate students and further facilitate the integration of general and professional education.

Epilogue

GETTING BEYOND THE REFORM SLOGANS

From the very beginning, **Project 30** has emphasized functional approaches to the conception of a new design for teacher education in America. Our hopes for reform rest squarely on the premise that faculty, students and administrators must act to create better ways to educate prospective teachers. They will do so individually and in small groups, and they will succeed in the settings they know best, the specific campuses where they teach, learn, and organize their academic interests. This anthology is a report of the beginning of this careful long-term process. It places **Project 30** in a reform tradition of sustained discovery and constructive progress.

Some educational reform reports of the past ten years served as catalysts for further thinking and for other reports. The 1983 report *A Nation at Risk* is a good example. The commission that produced the report disbanded shortly after its release. Therefore, the report's exceptional influence was due primarily to the work of other persons, some of whom wrote additional reports. The commission itself had no further role to play in school reform.

Other reports, like the Holmes Group's *Tomorrow's Teachers*, or Sizer's *Horace's Compromise*, led directly to the formation of an organization that was determined to bring about the reforms their reports advocated. In the case of the *Horace's Compromise* trilogy of reports, the Coalition of Essential Schools organization, formed by the authors, proved unable to penetrate the regulations from the teacher's unions and the state educational agencies that hampered the Coalition's efforts. Undaunted, the Coalition enlisted the help of the Education Commission of the States, led by the state governors, who established the Re:Learning project. This gave the Coalition's reform ideas greater influence in the states because the inhibiting regulations could be waived by a governor.

Along similar lines, the Task Force on Teaching as a Profession that produced *A Nation Prepared* continued working beyond publication of the report to seek implementation of the reforms. For example, it succeeded in carrying out its plans for national standards for "lead teachers" with the creation of the National Standards Board for Professional Teaching Practice. The Standards Board, as the group is often called, is currently developing a series of national tests of teaching competence that will eventually support the award of a national teaching credential for excellent teaching. The Standard Board's expectation is that the tests it develops will have a broad and profound impact on professional standards for teaching. Thus, teachers colleges will need to change if their graduates are to pass the more demanding tests, school districts will have to modernize their policies if they are to retain the services of nationally credentialed teachers, and communities will demand that their schools hire teachers who hold certificates that represent the excellence the Board hopes their tests can capture.

The reform efforts of **Project 30** are being pursued in a manner similar to Re:Learning, the Standards Board, and the Holmes Group. The strategies followed by these groups might be simply described as 1) stay in business, and 2) enlist the help of your friends. The first strategy is necessary in order to insure implementation of the ideas the reform effort advocates. The second strategy acknowledges that effective reform is truly systemic and thus inevitably larger than the best work of any one reform effort.

When **Project 30** began, and even after we issued the first year report, *The Reform of Teacher Education for the 21st Century*, we believed that after three years each participating institution's projects would be far enough along that the local teams could see the work through on their own campuses. By the third year, some promising projects were well underway on the campuses, as this volume documents, and several concrete instances of successful applications were apparent. Nonetheless, the teams had learned that systemic reform usually takes place over the long term, much longer than three years. At the same time, enthusiasm for the ideas enabling this constructive reform remained high. Thus, a strong sentiment developed to keep alive the sustained collaboration of arts and sciences faculty with education faculty for the purposes of pursuing the five Project 30 themes until a new design for teacher education is in place, and perhaps even beyond. From this energy was born the **Project 30 Alliance**, an organization that will carry out the work started by the original teams in **Project 30** and extend it to other campuses.

The planning for the **Project 30 Alliance** took place in April 1991 at a meeting of team leaders in Houston, the site of the first national meeting of **Project 30**. There the group commented on a set of draft by-laws, elected an executive committee, heard more about the projects at Millersville, Northern Colorado, and Vanderbilt, and held the seminars that have become a distinctive feature of each of the **Project 30** national meetings. In addition, the team leaders, who were representing their colleges of education and colleges of arts and sciences, heard from some likely friends of the proposed **Project 30 Alliance**, and were pleased to learn how many organizations would welcome the **Project 30 Alliance** and support its efforts to continue the work it has begun.

The Office of Educational Research and Improvement, of the United States Department of Education, recently conducted a major national competition to establish a few national research centers on education. One of the successful proposals led to the establishment in Michigan of the National Center for Research on Teacher Learning, which indicated in its proposal that it had chosen **Project 30** as a prime network to distribute its findings on how teachers learn, particularly how they learn to become teachers. The Center's research agenda examines three areas that are in line with **Project 30's** work: the examination of the teacher's prior beliefs about subject matter and pupil learning; the connection between the teacher's understanding of subject matter and the pedagogy required for a diverse population of students; and the context in which the prospective teacher can practice, be coached, and be reflective and deliberative about teaching. At the Houston meeting in April 1991, the Center's director, Mary Kennedy, and associate director, Bill McDiarmid, reviewed the productive fit between the Center's agenda and the proposed **Project 30 Alliance**.

In connection with the release of *Teachers for Our Nation's Schools* by John Goodlad, a member of the national advisory panel for **Project 30**, three organizations issued a series of pamphlets about what American leaders could do to advance the agenda for teacher education in our democracy. This is one of the major themes in Goodlad's book and in the work of the Center for Educational Renewal, which he directs. The authors of the pamphlets are the American Association of Colleges for Teacher Education, one of three sponsoring organizations of **Project 30**; the Center for Educational Renewal; and the Education Commission of the States. **Project 30** is cited in these pamphlets as a resource for what college and university leaders can do to help change teacher education. Moreover, the network of schools of education that the Center for Educational Renewal is working with under an EXXON grant are natural partners for the **Project 30 Alliance**.

Roger Soder, Associate Director of the Center for Educational Renewal, also attended the Houston meeting. In his presentation, he stressed that the reform of teacher education advocated by **Project 30** requires that reformers understand that teaching is first and foremost a moral activity. Reforms that focus exclusively on the improvement of the technical and subject matter aspects of pedagogy will fail, as will any proposed reforms that do not recognize that teaching in a democracy is intrinsically different from teaching in undemocratic societies.

Apart from the sponsoring organizations of **Project 30** cited in the Preface to this volume, no organization has been more generous in devoting program space to **Project 30** at its national meetings than the American Association for Higher Education (AAHE). The first public discussions of the **Project 30** themes and the announcement of the project itself were held at an AAHE meeting. The AAHE has followed the success of **Project 30** and has sought ways of extending the **Project 30** lessons for teacher education to all higher education. At the Houston meeting, Pat Hutchings, Director of AAHE's Teaching Initiative, enlisted the assistance of the **Project 30** schools in its own initiative on case studies of excellent teaching in higher education and its own School-College Partnership conferences.

Unlike the Holmes Group, whose membership is restricted to the major American research universities, **Project 30's** members represent every kind of college or university in the country that educates teachers as part of its mission. Like **Project 30,** the Holmes Group has from its inception recognized that the link with the liberal arts component of teacher education is a fundamental part of the reform of teacher education and the public schools. Thus, the work of **Project 30** is recognized by Holmes as an important, although indirect, part of the Holmes Group's agenda. Each holds common goals for the reform of the liberal arts components in teacher education. In the same way, the Renaissance Group of universities with historic interests in teacher education is a like-minded association that has an interest in promoting the aims of the **Project 30 Alliance**.

Carnegie Corporation of New York has extended the length of **Project 30** by two years, not only to insure that a book about **Project 30** is completed by Fallon and Murray, but also to assist in the establishment of the **Project 30 Alliance**. Several **Project 30** schools have used their projects as a centerpiece for additional local gifts and grants (e.g., Weber State, Pennsylvania, Northern Colorado) and others have had their work continued with support from the National Science Foundation (e.g., Vanderbilt) and from the Fund for the Improvement of Post-Secondary Education (e.g., Delaware). These are good signs that the **Project 30 Alliance** will prosper.

The Executive Committee elected at the Houston meeting has planned a national meeting to be held in conjunction with the meeting of the Council of Colleges of Arts and Sciences meetings in San Diego in early November 1991. This meeting is planned for the initial organization of the **Project 30 Alliance**, with the expectation that annual meetings of arts and sciences faculty members and education faculty members pursuing the reform initiative of **Project 30** will continue to take place thereafter.

At the outset of **Project 30**, we searched for an appropriate name for the project before we settled on the neutral designation of the number of participants. As it turned out, none of the early candidates would have accurately represented what the project has become. There was **PROTEUS** (Program reform of teacher education undergraduate studies), after the Greek god who could change his shape at will (often to deceive) and could foretell the future, **RESCUE** (Reform of education studies for curriculum in undergraduate education), and such other combinations as PASTE, FASTER, CASE, LATER, and RESURGE.

What any of our earlier acronyms would have obscured is the degree to which **Project 30** has become a symbol of a cooperative enterprise between liberal arts and education faculties. On some campuses, for example, a cooperative project between these faculties has become known as a "project 30 type of thing." The notion of the "alliance" captures this important aspect of the project. More than having "project 30" become a noun-phrase for cooperation, the **Project 30 Alliance** is about the phrase becoming a **verb**. A college or university that has been "project thirtied" will have been transformed because it will have found the way to move beyond reform slogans to substantive change, the kind of change that followed the Flexner report in medical education, for example.

The **Project 30 Alliance** will gradually offer membership to other colleges and universities that are able to make the same commitment to the reform of their own programs as the original members of the project. The required commitment is for a long-term university-wide effort to give honest guarantees that graduates of teacher education programs have been well educated and are entitled to be teachers.

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Participating Institutions

New York, New York 10010
Number of Schools/Colleges: 3
Number of Students: 13,500 undergraduates
3,000 graduates
Teacher Education Students: 500 undergraduates
200 graduates
Geographic Area Served by
Teacher Education Graduates: New York City with concentrations in Manhattan, Brooklyn, and the Bronx

Mission:

First, to meet the educational aspirations of people of the City of New York, without regard to race, gender or creed, by providing to them high quality, low cost undergraduate and graduate programs of study in the fields of business, public administration, the liberal arts and sciences, and education. The study of liberal arts is deemed an essential component of the college's professional courses of study and comprises at least half of all undergraduate programs.

Second, the college is dedicated to the economic well-being of New York City, New York State and the nation through scholarly research produced by its faculty in the business disciplines; to bettering the quality of public schooling in New York through its programs and research in education; and to increasing the body of knowledge in the liberal arts and sciences by virtue of faculty research in these areas.

Third, Baruch seeks, through education and training programs, to provide access to careers in business, public agencies, education and human services to those citizens of New York City who have been traditionally denied them: minorities, the economically disadvantaged, women, immigrants and the children of immigrants.

Project 30 Team Members:

Dr. Selma Berrol, Professor
History Department

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School of Education and Educational Services
Department of Art

Dr. Don Watkins, Professor
Director, Graduate Program, Educational Administration and Higher Education

Contact Person:

Dr. Don Watkins
(212) 387-1740

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Bridgewater, Massachusetts 02325
Number of Schools/Colleges: 23
Number of Students: 5,400 undergraduates
1,500 graduates
Teacher Education Students: 1,619 undergraduates
934 graduates
Geographic Area Served by
Teacher Education Graduates: Massachusetts

Mission:

Bridgewater State College, a regional public institution of higher education, offers a wide range of strong undergraduate programs and selected graduate programs in the arts and sciences and in the professions, thus enabling the College to respond to the academic needs of the diverse population of southeastern Massachusetts and to generate and provide those resources that are essential to the economic, cultural and civic well-being of the community, region, and state.

Bridgewater emphasizes teaching and life-long education within a framework of personal and professional ethics, and, in this process develops demonstrated critical thinking and communication skills. Essential to the success of this mission is the maintenance of a campus life that nurtures individual student development and encourages cultural diversity in a rapidly changing state, nation and world.

Project 30 Team Members:

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Director, Special Projects: Grants

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(508) 697-1218

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Brooklyn, New York 11210
Number of Schools/Colleges:
Number of Students: 12,000 undergraduates
4,000 graduates
Teacher Education Students: 1480 undergraduates
1250 graduates
Geographic Area Served by
Teacher Education Graduates: The greater New York City area with the largest concentrations in the borough of Brooklyn

Mission:

To provide the highest quality education to students of diverse ethnic religious and economic backgrounds.

Project 30 Team Members:

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School of Education

Dr. James Lovett, Associate Professor
School of Education

Dr. Karel Rose, Professor
School of Education

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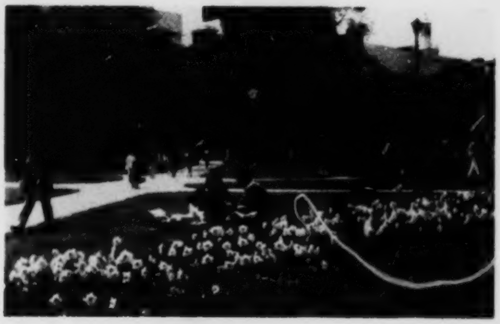

California State University

Los Angeles, California 90032
Number of Schools/Colleges: 6
Number of Students: 21,000
Teacher Education Students: 13,500 undergraduates
3,800 graduates
Geographic Area Served by
Teacher Education Graduates: The greater metropolitan Los Angeles area

Mission:

California State University, Los Angeles is an academic community that offers a comprehensive range of liberal and professional programs that prepare students for success in advanced study in their careers and throughout their lives. The University is committed to free scholarly inquiry and to academic excellence in undergraduate, graduate, and other postbaccalaureate and continuing education programs. This commitment underlies strong educational programs as well as research, scholarship, and creative and community service activities designed for the needs of a uniquely diverse student body. The excellence of these programs derives from a highly qualified faculty and support staff. These individuals are the keystone of the institution.

Project 30 Team Members:

Dr. Wayne Bishop, Professor
Department of Mathematics and Computer Science
School of Natural and Social Sciences

Dr. Barbara Boyer, Associate Professor
Department of Art
School of Arts and Letters

Dr. Donald Dewey, Dean
School of Natural and Social Sciences

Dr. Andrea Maxie, Assistant Professor
Division of Curriculum and Instruction
School of Education

Dr. Allen Mori, Dean
School of Education

Dr. Bobby Patton, Dean
School of Arts and Letters

Dr. Judith Washburn, Professor
Division of Curriculum and Instruction
School of Education

Contact Person:
Dr. Allen Mori
(213) 343-4300

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The University of Dayton

Dayton, Ohio 45469
Number of Schools/Colleges: 5
Number of Students: 6500 undergraduates
3500 graduates
Teacher Education Students: 650 undergraduates
1100 graduates
Geographic Area Served by
Teacher Education Graduates: Ohio, New York, Pennsylvania,Indiana, Illinois, and Michigan

Mission:

The University of Dayton, by tradition, by legal charter, and by resolute intent, is a church-related institution of higher learning. As such, it seeks, in an environment of academic freedom, to foster principles and values consonant with Catholicism and with the living traditions of the Society of Mary. Operating in a pluralistic environment, it deliberately chooses the Christian world-view as its distinctive orientation in carrying out what it regards as four essential tasks: teaching, research, serving as a critic of society, and rendering public service.

The University of Dayton has as its primary task to teach—that is, to transmit the heritage of the past, to direct attention to the achievements of the present, and to alert students to the changes and challenges of the future. It regards teaching as more than the mere imparting of knowledge; it attempts to develop in its students the ability to integrate knowledge gained from a variety of disciplines into a meaningful and viable synthesis.

The University of Dayton holds that there is harmony and unity between rationally discovered and divinely revealed truths. Accordingly, it commits its entire academic community to the pursuit of such truths. It provides a milieu favorable to scholarly research in all academic disciplines, while giving priority to studies which deal with problems of a fundamentally human and Christian concern. It upholds the principles of responsible freedom of inquiry, offers appropriate assistance to its scholars, and endeavors to provide the proper media for the dissemination of their discoveries.

The University of Dayton exercises its role as critic of society by creating an environment in which faculty and students are free to evaluate strengths and weaknesses found in human institutions. While, as an organization, it remains politically neutral, objective, and dispassionate, it encourages its members to judge for themselves how these institutions are performing their proper tasks; to expose deficiencies in their structure and operation; and to propose and actively promote improvements when these are deemed necessary.

The University of Dayton recognizes its responsibility to support, with means appropriate to its purposes, the legitimate goals and aspirations of the civic community and to cooperate with other agencies in striving to attain them. It assists in promoting the intellectual and cultural enrichment of the community; also it strives to inspire persons with a sense of community and to encourage men and women of vision to participate effectively in the quest for a more perfect human society.

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Project 30 Team Members:

Dr. John Geiger, Associate Dean
Department of Teacher Education

Dr. Ellis Joseph, Dean
School of Education

Dr. Thomas J. Lasley, Professor
Chair, Department of Teacher Education

Dr. Thomas Matczynski, Professor
Department of Educational Administration

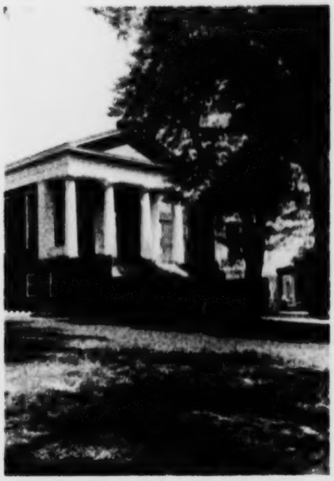
Dr. Paul Morman, Dean
College of Arts and Sciences

Dr. Michael Payne, Director, CORE
Associate Professor, Philosophy Department

Dr. Mary Sudzina, Assistant Professor
Department of Teacher Education

Contact Person:

Dr. Thomas J. Lasley
(513) 229-3344



Newark, Delaware 19716
Number of Schools/Colleges: 10
Number of Students: 20,477
Teacher Education Students: 1299 undergraduates
256 graduates
Geographic Area Served by
Teacher Education Graduates: Delaware, New Jersey, Pennsylvania, Maryland

Mission:

The University stands for excellence in the education of its undergraduate and graduate students, in scholarship, and in service to its state and to society. To accomplish its mission, the University maintains an environment where creativity, critical thinking, free inquiry, and respect for the views and values of others flourish. University governance is conducted in a spirit of openness and cooperative interaction among the trustees, administrators, faculty, staff, and students. The University strives to make all people feel welcome regardless of their cultural, ethnic, or religious backgrounds or of their race, color, age, gender, or sexual preference. Balance between the liberal arts and the technical and professionally-oriented disciplines and between undergraduate and graduate education is a University goal.

Project 30 Team Members:

Dr. Nancy Brickhouse, Assistant Professor
Department of Educational Development

Dr. Heyward Brock, Associate Dean
College of Arts and Science

Dr. Frank B. Dilley, Chair
Department of Philosophy

Dr. Jack D. Ellis, Chair
Department of History

Dr. Frank Murray, Dean
College of Education

Dr. Harry Shipman, Professor
Department of Physics and Astronomy

Dr. Ivar Stakgold, Chair
Department of Mathematical Sciences

Dr. William B. Stanley, Chair
Department of Educational Development

Elaine Stotko, Assistant Dean
College of Education

Contact Person:

Dr. Frank Murray
(302) 451-2311

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Tallahassee, Florida 32307
Number of Schools/Colleges: 12
Number of Students: 8,300
Teacher Education Students: 600 undergraduates
150 graduates
Geographic Area Served by
Teacher Education Graduates: Florida

Mission:

As The Florida Agricultural and Mechanical University projects its role for its second century of service into the twenty-first century, it must accept the emerging challenges of the State and the nation. The University will maximize its capabilities by developing competitive new programs while revising, redirecting, strengthening, and enhancing existing programs. Graduate study and research will continue to be among the priorities for the University as it seeks to achieve the program balance and level of a comprehensive university. New master's level programs will be initiated in appropriate areas and doctoral level degree programs will be developed and initiated in selected areas of need where strong faculty and resource bases already exist.

The Florida Agricultural and Mechanical University remains committed to the concept and practice of equal access and equal opportunity in post-secondary education for all Florida citizens. It will continue to focus special attention on the educational needs of Blacks as well as the preservation of the cultural values associated with Black culture.

Project 30 Team Members:

Dr. William H. Castine, Chairperson
Department of Secondary Education

Dr. Melvin F. Gadson, Dean
College of Education

Dr. Thomas H. Jackson, Professor
College of Education

Dr. Ivy A. Mitchell, Associate Professor
Department of Languages and Literature

Dr. Aubrey M. Perry, Dean
College of Arts and Sciences

Dr. Louis H. Pratt, Chairperson
Department of Languages and Literature

Dr. Betsey S. Whitman, Chairperson
Department of Mathematics

Contact Person:
Dr. Betsey S. Whitman (leave of absence)
Dr. O. Anderson, Chairperson
Department of Mathematics
(904) 599-3595

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Athens, Georgia 30602
Number of Schools/Colleges: 13
Number of Students: 28,000
Teacher Education Students: 1,543
Geographic Area Served by
Teacher Education Graduates: Georgia

Mission:

The University of Georgia, a land-grant university, is the state's oldest, most comprehensive, most diversified institution of higher education. Its constituencies are numerous, and the scope of its programs in graduate, professional, and undergraduate education is the most extensive in the state. As Georgia's leading institution of higher learning, the University has the following major purposes:

- To disseminate knowledge through teaching in the academic disciplines and fields of professional study that make universities distinctive; related to this purpose are programs and other opportunities for students' intellectual, professional, and personal development.
- To advance knowledge through research, scholarly inquiry, and the creative arts; related to both teaching and research is the conservation and enhancement of the state's and the nation's intellectual, cultural, and environmental heritage.
- To provide service to the public through consultation, technical assistance, short-term instruction, training, and other opportunities for continued learning, growth, and development.

To fulfill its multiple purposes and commitments, The University of Georgia defines its instructional, research, and public service missions as broadly as possible, with an explicit commitment to excellence in all of its missions. Since the quest for knowledge is universal, a global perspective is necessary to provide students with educational opportunities consistent with the international dimensions of their future careers and personal lives.

Project 30 Team Members:

Dr. Alphonse Buccino, Dean
College of Education

Dr. Richard Bouldin, Head
Department of Mathematics

Dr. Alan Jaworski, Professor
Botany Department

Dr. Joseph P. Riley, Professor
Science Education

Dr. Russell Russyeany, Director
School of Teacher Education

Dr. Deborah Tippens, Assistant Professor
Science and Elementary Education

Dr. Patricia Wilson, Associate Professor
Mathematics Education

Contact Person:

Dr. Russell Russyeany
(404) 542-1151

Washington, DC 20059
Number of Schools/Colleges: 18
Number of Students: 12,000
Teacher Education Students: 102 undergraduates
181 graduates
Geographic Area Served by
Teacher Education Graduates: New York, California, the Caribbean, and the metropolitan area of Washington, D.C.

Mission:

The mission of Howard University includes the provision of quality education for any student, but with emphasis upon the provision of educational opportunities for those students who may not otherwise have an opportunity to acquire an education of the type provided at Howard. Howard University has approximately 12,000 students and over 2,000 faculty. The student body represents over 90 countries.

Project 30 Team Members:

Dr. Franklin Ampy, Associate Professor
Department of Zoology

Dr. Dolores Dickerson, Associate Dean
Acting Chairman, School of Education

Dr. Annette Dunzo, Associate Professor
Department of Romance Languages

Dr. John Rier, Professor
Department of Geology and Geography

Dr. Portia H. Shields, Associate Professor
Education and
Director, Office of Medical Education

Contact Person:
Dr. Portia H. Shields
(202) 806-6281

Terre Haute, Indiana 47809
Number of Schools/Colleges: 6
Number of Students: 12,005
Teacher Education Students: 1,639undergraduates
543 graduates
Geographic Area Served by
Teacher Education Graduates: Primarily Indiana and east-central Illinois

Mission:

Indiana State University was established by legislative action in 1865 as a State Normal School "for the preparation of teachers for the common schools of Indiana" and began matriculating students five years later. Its first baccalaureate degrees were awarded in 1908 and its first master's degrees in 1928, a year prior to its being named a Teachers College. Over the next four decades, the curriculum was greatly expanded to provide opportunities for students in almost all fields of teacher education, in a full range of disciplines in the arts and sciences, and in business, nursing, technology, health, and physical education. By 1965, the institution began offering a small number of doctoral programs in education, and its name was changed to Indiana State University.

ISU's curriculum today includes a comprehensive array of undergraduate and master's degree programs in its College of Arts and Sciences and five professional schools, as well as doctoral degree programs in four areas of education, two areas of geography, four areas of life sciences, and clinical psychology. The majority of the University's programs and courses are offered on its campus in Terre Haute, although many courses and several degree programs are offered at other sites throughout the State of Indiana. Ethnic and cultural diversity are important to the institution. While focusing its attention on the educational needs of students in the west-central portion of the State and on minorities, ISU matriculates undergraduate and graduate students from all of the State's ninety-two counties, all of the nation's fifty states, and approximately seventy foreign countries.

Thirty-eight percent of the University's baccalaureate degree recipients in 1989 graduated in an arts and sciences discipline, but nearly 18 percent of those individuals achieved teacher certification. The School of Education graduated just over 10 percent of the University's baccalaureate students. Of the remaining baccalaureate degree recipients in the University, 7.3 percent achieved teacher certification. The fact that 21.8 percent of the baccalaureate students graduated with teacher certification would suggest that Indiana State University's normal school and teachers' college heritage are still very much in evidence.

Project 30 Team Members:

Dr. J. Stephen Hazlett, Dean
School of Education

Dr. Marvin A. Henry, Chair
Department of Secondary Education

Dr. Gail M. Huffman, Associate Dean
School of Education

Dr. Robert Perrin, Professor
English Department

Dr. Joe Weixlmann, Associate Dean
College of Arts & Sciences

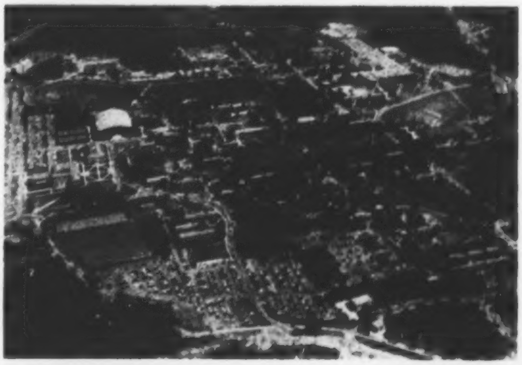
Contact Persons:

Dr. Gail Huffman
(812) 237-2893

Dr. Joe Weixlmann
(812) 237-2784

College Park, Maryland 20742
Number of Schools/Colleges: 14
Number of Students: 35,000
Teacher Education Students: 752 undergraduates
1322 graduates
Geographic Area Served by
Teacher Education Graduates: Maryland, Washington DC, Virginia, Pennsylvania, Delaware

Mission:



The University of Maryland at College Park is officially designated by the legislature as the flagship of the University of Maryland System. The mission places emphasis on research and graduate study, exemplary undergraduate education for talented students, and service to the state, nation and international community. Legislative intent is to provide facilities and resources comparable to those of the upper echelon of peer institutions.

Project 30 Team Members:

Dr. Richard Arends, Professor
College of Education

Dr. Linda Berg, Lecturer
Department of Botany

Dr. William Higgins, Associate Professor
Department of Zoology

Dr. Dale Scannell, Dean
College of Education

Dr. Thomas Weible, Associate Dean
College of Education

Contact Person:
Dr. Thomas Weible
(301) 405-2336

Memphis, Tennessee 38152
Number of Schools/Colleges: 6
Number of Students: 16,400 undergraduates
4,100 graduates
Teacher Education Students: 903 undergraduates
859 graduates
Geographic Area Served by
Teacher Education Graduates: Tennessee, Arkansas, Mississippi

Mission:

From the opening of its doors in 1912 as a normal school for training teachers to its present status as one of Tennessee's comprehensive universities, Memphis State University (MSU) has been thrust forward by the growth of Memphis and the Mid-South. A town oriented to a rural economy and culture in 1900 grew into a large urban and commercial center by mid-century, and the city's public institution of higher learning experienced comparable growth. Now a research university, MSU is located in the largest metropolitan area in Tennessee and the Mid-South. Its primary mission is to be a comprehensive university that provides an environment for intellectual, cultural and ethical development through a wide range of programs. MSU strives to achieve and maintain this mission as part of two major communities: the national and international academic community of scholars and students; and the state of Tennessee and the Mid-South, especially metropolitan Memphis. In both communities the University strives for excellence and seeks to contribute substantially to the quality of life of its various constituencies.

Project 30 Team Members:

Dr. Ronald W. Cleminson, Director
Center for Environmental/Energy Education

Dr. George W. Etheridge, Director
Graduate Studies

Dr. Donald Franceschetti, Chair
Department of Physics

Dr. H. Graden Kirksey, Chair
Department of Chemistry

Dr. W. Theodore Mealor Jr., Chair
Department of Geography
Associate Vice-President for Academic Programs and Planning

Dr. James F. Payne, Chair
Department of Biology

Contact Person:

Dr. George W. Etheridge
(901) 678-2352

Millersville, Pennsylvania 17551
Number of Schools/Colleges: 3
Number of Students: 7,001 undergraduates
790 graduates
Teacher Education Students: 2,588 undergraduates
506 graduates
Geographic Area Served by
Teacher Education Graduates: South central Pennsylvania

Mission:

Millersville University dedicates itself to fulfilling its primary mission of providing excellent instructional programs conforming to the highest standards of traditional liberal arts education. The University is steadfastly committed to the proposition that a thorough, broad-based foundation in the arts and sciences is a necessary condition for the development of the whole person. It resolutely embraces the conviction that its degree programs must maintain a strong liberal arts component while preparing students to engage in productive and meaningful lives.

Millersville University resolves to provide a comprehensive range of meritorius baccalaureate programs to all qualfied students at the lowest reasonable cost to Commonwealth residents. It will strive to offer programs consistent with student aspirations, faculty wisdom and expertise, and the requirements of a complex industrial world. It will offer graduate and associate degree programs in those fields where there is both need and corresponding institutional strength. Through all of its programs, Millersville University will provide students with opportunities for academic, personal, social, and cultural growth essential to the development of an educated and productive person.

While Millersville University recognizes excellence in teaching and the cultivation of minds as its reason for being, the University also accepts its responsibility to provide opportunities for research, artistic and scholarly effort, and other creative endeavors in a manner consistent with its primary mission as a teaching institution. Additionally, the University accepts its responsibility to serve society by acting as a resource for businesses and agencies.

Toward these ends, the Millersville University community pledges itself to academic freedom and to the nurturing of an environment designed to stimulate imagination and curiosity, encourage unfettered discourse, tolerate divergent and controversial opinion, enhance multicultural awareness and understanding, and foster mutual respect and cooperation among its members.

The Millersville University community acknowledges that the realization of the ideals set forth in this Mission requires the commitment of a large and diverse group of people who, in spite of differing academic specialities, interests and styles, are of a common mind concerning the importance and value of a liberating education. The University community affirms that it is the process of learning and the intellectual and moral maturation accompanying it that are to be valued and pursued.

Project 30 Team Members:

Dr. Rosario Caminero, Assistant Professor
Foreign Languages

Dr. Sam Casselberry, Chair
Sociology and Anthropology

Dr. Christopher Dahl, Dean
Humanities and Social Sciences

Dr. Linda Clark-Newman, Professor
History

Dr. Cynthia Dilgard, Chair
English

Dr. Sam Ha, Professor
Biology

Dr. Pat Hill, Assistant Professor
Chemistry

Dr. Albert Hoffman, Dean
Science and Mathematics

Dr. Keith Lauderbach, Associate Professor
Industry and Technology

Dr. Nancy Smith, Dean
School of Education

Dr. Barbara Stengel, Assistant Professor
Educational Foundations

Contact Person:

Dr. Barbara Stengel
(717) 872-3785

Albuquerque, New Mexico 87131
Number of Schools/Colleges: 11
Number of Students: 28,600
Teacher Education Students: 315 undergraduates
430 graduates
Geographic Area Served by
Teacher Education Graduates: New Mexico

Mission:

UNM is the largest and most comprehensive higher education institution in New Mexico. Twenty-three years older than the state itself, the University has grown from an original enrollment of 75 to more than 28,600 students on five campuses.

UNM offers the broadest range of programs in New Mexico with more than 4,000 courses and 125 degrees and nationally recognized programs in Latin American studies, anthropology, biology, laser optics, environmental studies and photography.

Project 30 Team Members:

Dr. David Colton, Professor
College of Education

Dr. David Darling, Professor
College of Education

Dr. Nancy Gonzales, Professor
Department of Mathematics and Statistics

Dr. Richard Griego, Dean
Graduate Office

Dr. Dick Metzler, Professor
Department of Mathematics and Statistics

Dr. Phyllis Metzler, Coordinator for Mathematics
Albuquerque Public Schools

Dr. Hobson Wildenthal, Dean
College of Arts and Sciences

Contact Person:
Dr. Dick Metzler
(505) 277-4147

The University of North Carolina at Chapel Hill

Chapel Hill, North Carolina 27599-3500
Number of Schools/Colleges: 13
Number of Students: 22,447
Teacher Education Students: 419 undergraduates
77 graduates
Geographic Area Served by
Teacher Education Graduates: South and the Southeastern portion of the United States.

Mission:

The University has been built by the people of the State and has existed for two centuries as the nation's first state university. Through its excellent undergraduate programs, it has provided higher education to ten generations of students, many of whom have become leaders of the State and the nation. Since the nineteenth century, it has offered distinguished graduate and professional programs.

The University of North Carolina at Chapel Hill is a research university. Fundamental to this designation is a faculty actively involved in research, scholarship, and creative work, whose teaching is transformed by discovery and whose service is informed by current knowledge.

The mission of the University is to serve all the people of the State, and indeed the nation, as a center for scholarship and creative endeavor. The University exists to expand the body of knowledge; to teach students at all levels in an environment of research, free inquiry, and personal responsibility; to improve the condition of human life through service and publication; and to enrich our culture.

Project 30 Team Members:

Dr. Gillian Cell, Dean
College of Arts and Sciences

Dr. Darryl Gless, Associate Dean
General College

Dr. Donald Stedman, Dean
Teacher Educaation

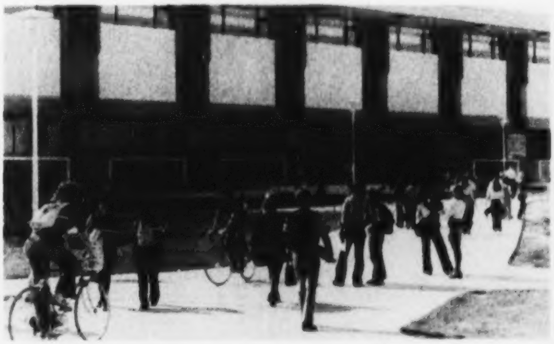
Contact Person:

Dr. Donald Stedman
(919) 966-7000

University of Northern Colorado

Greeley, Colorado 80639
Number of Schools/Colleges: 5
Number of Students: 9,645
Teacher Education Students: 1,500 undergraduates
1,000 graduates
Geographic Area Served by
Teacher Education Graduates: Arizona, California, Colorado, Idaho, Kansas, Nebraska, New Mexico, Oregon, Texas, Utah, Washington, Wyoming

Mission:



Now in its second century of service to the state, region, and nation, the University of Northern Colorado has grown from its beginning as the state normal school into a maturing, multipurpose university whose primary mission is to provide high-quality instruction while developing research and carrying out public service.

Founded in 1889, UNC maintains its traditional role as a national leader in the field of teacher education and offers more than 100 degree programs through five undergraduate colleges and the graduate school. The colleges are Arts and Sciences, Business Administration, Health and Human Sciences, and Performing and Visual Arts.

As it prepares to enter the twenty-first century, UNC has established a reputation for excellent programs, diversity, and a highly prized balance of the personal contact with students typically found at small, private universities and the broad range of cultural, social, and intellectual opportunities found at major state universities. UNC's programs in teacher education have consistently ranked among the top ten in the United States over the past sixty years.

Project 30 Team Members:

Dr. Bruce W. Broderius, Director
Division of Elementary, Middle School, Early Childhood

Dr. Carolyn A. Cody, Associate Dean
College of Health and Human Sciences

Dr. Gene E. Hall, Dean
College of Education

Dr. Roger A. Kovar, Dean
College of Arts and Sciences

Dr. Lynn A. Sandstedt, Chair
Department of Hispanic Studies

Contact Person:
Dr. Carolyn A. Cody
(303) 351-1726

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Stockton, California 95211
Number of Schools/Colleges: 11
Number of Students: 5,457
Teacher Education Students: 180 undergraduates
120 graduates
Geographic Area Served by
Teacher Education Graduates: California

Mission:

The University of the Pacific aspires to be a model of excellence for the private comprehensive university in the Western United States. In the range of its academic programs and its commitment to the best traditions of teaching and scholarship, the University will enable students of diverse backgrounds to assume responsible leadership in the 21st century. By integrating the values of liberal education with professional studies and a love of learning with committed service to others, students grow intellectually, ethically, and socially.

The University's size and attractive campus is well suited to its goals: large enough for academic choice and small enough for individual mentoring. As a comprehensive institution, the University offers a unique constellation of quality programs in arts and sciences, business, dentistry, education, engineering, international studies, law, music, and pharmacy. Through jointly sponsored programs, including a coherent general education sequence, the college and schools of the University contribute to the intellectual life of the campus while maintaining the integrity of their disciplinary majors. The balance of faculty and students ensures collaborative and interactive education in which students are encouraged to think imaginatively and critically.

As active participants in a community of learners, the faculty, students, and staff expand the process of education to the campus and the local region. As teacher scholars, the faculty are engaged in discovering and sharing knowledge, and they are committed to a synthesis of the liberal arts and professional education. Since the students live in an increasingly pluralistic society, the University promoted an understanding of gender, multicultural, and global perspectives through its courses, scholarly activities, and campus life as well as by attracting and retaining faculty, students, and staff who represent cultural, ethnic, and generational diversity. In that the education of citizens extends beyond the classroom, students participate in a broad spectrum of co-curricular activities in areas such as residential life, student government, community service, work experience, and sports.

As the oldest chartered institution in California, the University has preserved a pioneering spirit through a history of innovative higher education. The University is enriched by the cultural diversity of Stockton, the natural beauty of the Sierra mountains, the historical sites of the Motherlode, the state capitol in Sacramento, and the proximity of the cosmopolitan San Francisco Bay Area. The University is committed to the Central Valley of California — to serve as a cultural resource, to assist in economic development, and to enhance the quality of life of this region.

In fulfilling this vision, the University of the Pacific seeks to offer an uncommon education.

Project 30 Team Members:

Dr. Robert Benedetti, Dean
College of the Pacific

Dr. Robert Cox, Professor
English

Dr. Fay B. Haisley, Dean
School of Education

Dr. Margaret A. Langer, Professor and Chairperson
Curriculum and Instruction

Dr. Eugene Pearson, Professor
Geology

Dr. Andres Rodriguez, Professor
Physics

Contact Person:

Dr. Fay B. Haisley
(209) 946-2680

Pembroke State University

Pembroke, North Carolina 28372
Number of Schools/Colleges: 16 Departments
Number of Students: 2,712 undergraduates
369 graduates
Teacher Education Students: 703 undergraduates
284 graduates
Geographic Area Served by
Teacher Education Graduates: Southeastern North Carolina

Mission:

PEMBROKE STATE UNIVERSITY

Pembroke State University, as a constituent institution of The University of North Carolina, is committed to academic excellence in a balanced program of teaching, research and service. Student engagement with a faculty dedicated to sound, vigorous teaching and to dynamic contributions in their academic disciplines enables Pembroke State University graduates to perform with distinction within and beyond the region.

Founded in 1887 as an institution for the education of American Indians, Pembroke State University will continue to affirm the unique strength of its culturally diverse student body, community and region. The interaction within and among these groups fosters social consciousness and sensitivity to the rights and views of others, encouraging appreciation of different cultures in a global perspective.

Through education as a lifelong experience, the University is committed to enhancing and enriching the intellectual, economic, social, cultural and political life of the region.

In support of this mission, Pembroke State University is committed:

1. To maintain an environment of free inquiry in which a dynamic faculty enjoys teaching and research and in which students learn and experience growth.
2. To ensure quality academic programs and learning opportunities for the liberal arts, in preparation for diverse professions, and for service to the region.
3. To encourage and support meaningful faculty research and development.
4. To recruit and retain students capable of achieving academic and professional success and of enriching the intellectual, cultural and social community of the University.
5. To provide and support extra-curricular and student life activities and facilities designed to enrich the educational experience of residential and commuter students, enhance the image of the University, and serve the region.
6. To provide ways by which the life of the region can benefit the educational experience of the University and be enhanced by the University.
7. To instill in Pembroke State University students a continuing appreciation for diverse cultures and an active concern for the well-being of others.
8. To reflect a commitment to academic and scholarly excellence, to the University's rich heritage, and to enhancement of the immediate and larger region.

Project 30 Team Members:

Dr. Paul Wright Killian, Chairman
Department of Psychology

Dr. Gerald D. Maynor, Professor
Department of Education

Dr. Gilbert Sampson, Chairman
Department of Mathematics and Computer Science

Dr. Kathryn Sullivan, Director
Teacher Education

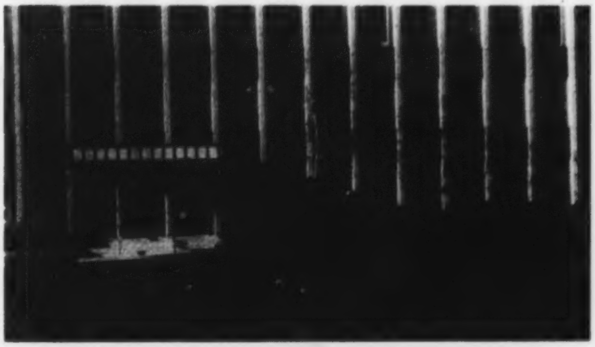
Mr. Paul Van Zandt, Chairman
Department of Art

Contact Person:

Dr. Kathryn Sullivan
(919) 521-4214

Philadelphia, Pennsylvania 19104
Number of Schools/Colleges: 13
Number of Students: 20 undergraduates
67 graduates
Teacher Education Students: 125
Geographic Area Served by
Teacher Education Graduates: The Northeast corridor between Boston and Washington, DC is served by graduates and a broader national region is served by undergraduates

Mission:



The location of the Graduate School of Education in a major metropolitan region enables our faculty and students to address problems in urban education—issues of equity and diversity, educational opportunity and educational excellence, and the management of complex organizations. The School engages in a continuous exchange of knowledge and expertise with the surrounding community. We encourage collaborative partnerships with school districts, individual schools and school teachers, with day care centers, unions, and corporations.

At the Graduate School of Education we emphasize praxis, the joining of theory and action in ways that allow us to be scholars, policy makers, and practitioners. We reject the traditional dichotomy between theory and practice; as part of a great research university, we hold rigorous scholarship in high regard, but we believe that the purpose of scholarly endeavors is to inform debate about education and to improve educational policy and practice. Much of the work at the Graduate School of Education is interdisciplinary. Our educational psychologists work with historians, our linguists with reading and writing experts. Both the Institute for Research on Higher Education and Literacy Research Center bring together scholars from many different disciplines. Education faculty teach students from other schools within the university—Arts and Sciences, Wharton, Nursing, Social Work. These links represent one of our greatest strengths. They allow us to merge our commitments to theory and practice and to develop problem-solving approaches that recognize the complexities of the educational process.

The challenges education faces today are both uplifting and daunting. Nonetheless, the concentration of talent and energy within our school and the array of resources provided by the university and the community offer us a promising means of addressing these challenges. Penn's Graduate School of Education is an environment charged with the excitement of sustained inquiry and engagement.

Project 30 Team Members:

Dr. Jonathon Baron, Professor
Psychology

Dr. Marilyn Cochran-Smith, Assistant Professor
Education

Dr. Herman Gluck, Professor
Mathematics

Dr. James M. Larkin, Adjunct Associate Professor
Education

Dr. Walter Licht, Associate Professor
History

Contact Person:
Dr. Marilyn Cochran-Smith
(215) 898-7378

San Antonio, Texas 78284-0400
Number of Schools/Colleges: 2
Number of Students: 2,900 undergraduates
800 graduates
Teacher Education Students: 300 undergraduates
0 graduates
Geographic Area Served by
Teacher Education Graduates: San Antonio, Houston, Dallas, El Paso

Mission:

St. Mary's University provides a Catholic educational experience which places academic excellence as its top priority. It integrates a strong liberal arts program with professional preparation and ethical commitment. It places quality teaching as its first priority and its faculty endeavor to develop within their students a broad range of academic knowledge and skills, professional training, and a mature, sensitive and moral conscience.

The University seeks to respond to the changing needs of its students and our society and to create effective and participative structures and modes of education that foster excellence in education. It seeks to develop among faculty, administration, staff and students a sense of Christian Community; and then to reach out in service to the communities of San Antonio, the Southwest, our nation and our world through the spiritual, intellectual, professional, and moral leadership of all its members. St. Mary's strives to contribute to the urgent task of extending justice, freedom, and dignity to all people.

Project 30 Team Members:

Dr. Gerard Dizinno, Coordinator
Outcomes Assessment

Dr. Melba Hutsell, Chair
Department of Education

Dr. Charles Miller, S.M., Dean
Humanities and Social Sciences

Dr. Nancy Newton, Director
Student Teaching, Department of Education

Dr. Patricia Owen, Director
Clinical Program, Department of Psychology

Dr. Gerald Pratt, Certification Officer
Department of Education

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Brother Peter Pontolillo, S.M., Superintendent
San Antonio Archdiocesan Catholic Schools

Dr. Ann Semel, SSND, Chair
Department of English and Communications

Contact Person:

Dr. Ann Semel
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San Diego, California 92812
Number of Schools/Colleges: 7
Number of Students: 35,000
Teacher Education Students: 800
Geographic Area Served by
Teacher Education Graduates: Southern California

Mission:

The largest of the twenty universities composing the California State University system, San Diego State University has over 35,000 students and 2,000 faculty members (1200 full-time). In short, San Diego State is a major regional university. Its seven colleges presently offer seventy-five bachelor's degrees, fifty-five master's degrees, and six joint doctorates. Through its programs in the arts and sciences the University aspires to have students understand themselves and their cultural, physical, social, and institutional world. The University's professional programs, both undergraduate and graduate, prepare students for the proficient and successful practice of a profession. SDSU has the largest College of Education in the State of California. Although there is no undergraduate education program, approximately 800 students per year enroll in the fifth-year basic teacher education program.

Project 30 Team Members:

Dr. Nicholas A. Branca, Professor
Mathematics

Dr. Rafaela Santa Cruz, Associate Professor
School of Teacher Education

Dr. Ann I. Morey, Dean
College of Education

Dr. Donald R. Short, Dean
College of Sciences

Dr. Francis N. Stites, Professor
History

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(619) 594-6355

Santa Clara University

Santa Clara, California 95053
Number of Schools/Colleges: 4
Number of Students: 3,700 undergraduates
4,000 graduates
Teacher Education Students: 100 undergraduates
50 graduates
Geographic Area served by
Teacher Education Graduates: California, especially the Bay area

Mission:

Santa Clara University (SCU) was begun by the Franciscans who founded Mission Santa Clara in 1777 and continued by the Jesuits who opened the College in 1851. The University declares its purpose to be the education of the human person within the Catholic and Jesuit tradition.

Project 30 Team Members:

Dr. Rosemarie Beebe, University Director
Multidisciplinary Studies Pre-Teaching Program

Dr. Alma Garcia, University Director
Multidisciplinary Studies Pre-Teaching Program

Dr. Dong Hau, Program Coordinator
Refugee children
Indochinese Curriculum Specialist

Dr. Joyce E. King, Director
Teacher Education Program

Dr. Gloria Ladson-Billings, Acting Director
Assistant Director of Teacher Education

Dr. Carol Rossi, Assistant Director
Teaching and Learning Center

Dr. Jo Ann Vasquez, Dean
Division of Counseling Psychology and Education

Contact Person:

Dr. Joyce E. King
(408) 554-4434

New Orleans, Louisiana 70216
Number of Schools/Colleges: 5
Number of Students: 4,200
Teacher Education Students: 350 undergraduates, graduates?
Geographic Area Served by
Teacher Education Graduates: Orleans, Plaquemines, St. Bernard and other parishes in Southeast Louisiana

Mission:

Southern University at New Orleans is a small, public, historically black univeristy (HBCU) located in New Orleans, Louisiana.

The mission of SUNO is to create and maintain an environment conducive to learning and growth, to promote the upward mobility to all people by preparing them to enter into new as well as traditional careers, and to equip them to function optimally in the mainstream of American Society.

SOUTHERN UNIVERSITY AT NEW ORLEANS

The University embraces six basic objectives: (1) to afford to the citizenry of the Greater New Orleans Metropolitan Area increased opportunities for higher learning; (2) to provide instruction for the working adult populace of the area who seek to continue their education in the evenings or on the weekend; (3) to train individuals for positions in business, education, industry, and government; (4) to prepare students for graduate work or advance study; (5) to instruct at the graduate level for the awarding of advanced degrees, and (6) to provide opportunities for personal development, self-understanding, and an enhanced self-image.

Project 30 Team Members:

Dr. Mack Felton, Chair
Department of Biology

Dr. Sandra Hollis, Chair
Department of Fine Arts and Philosophy

Dr. John Jones, Curriculum Specialist
Social Studies

Dr. Louise Kaltenbaugh, Coordinator
Alternative Certification Program
College of Education

Dr. Viola King, Dean
Evening and Weekend College

Dr. Ding Kuo, Dean
College of Arts and Social Sciences

Dr. Richard Majeste, Dean
College of Science

Dr. Linda Stelly, Associate Superintendent of Schools
Orleans Parish System

Dr. Harold Weaver, Dean
College of Education

Contact Person:
Dr. Louise Kaltenbaugh
(504) 286-5351

State University of New York at Buffalo

Buffalo, New York 14260
Number of Schools/Colleges: 15
Number of Students: 27,000
Teacher Education Students: 75 undergraduates
1100 graduates
Geographic Area Served by
Teacher Education Graduates: Western New York

Mission:

The State Univerrsity of New York at Buffalo is the largest and most comprehensive university center in the State University of New York System. Its focus is on research, teaching and public service. Its research mission is supported by more than fifty centers and institutes. Its teaching mission is supported by fifteen divisions, including Architecture and Planning, Education, Engineering, Law, Information and Library Studies, Management, Social Work, five schools in the health sciences, and three arts and sciences faculties. Committed to keeping an appropriate balance between its research and educational missions, the university has established a new Undergraduate College with a mandate to "reaffirm the centrality of liberal education" in the university's undergraduate programs. This College has designed an ambitious new general education program which includes attention to many of the Project 30 goals.

Project 30 Team Members:

Dr. Stephen I. Brown, Professor
Education Organization, Administration and Policy

Dr. D. Allan Cadenhead, Professor
Chemistry

Dr. Catherine Cornbleth, Professor
Learning and Instruction

Dr. Clyde F. Herreid, Distinguished Teaching Professor
Biological Sciences

Dr. Ruth Meyerowitz, Assistant Professor
American Studies

Dr. Orville T. Murphy, Professor
History

Dr. Robert S. Newman, Associate Professor
English

Dr. Hugh G. Petrie, Dean
Graduate School of Education

Dr. Norman Solkoff, Professor
Psychiatry

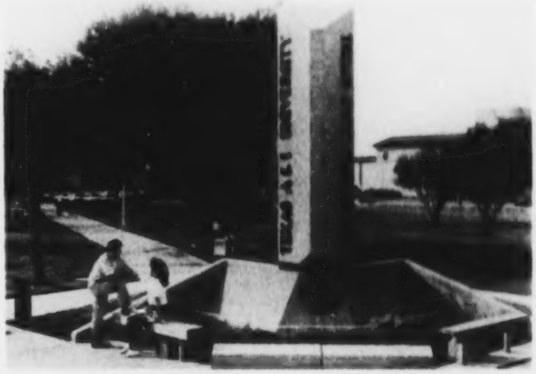
Dr. John A. Thorpe, Vice Provost
Undergraduate Education and
Dean of the Undergraduate College

Contact Person:
Dr. John A. Thorpe
(716) 636-2991

Kingsville, Texas 78363
Number of Schools/Colleges: 6
Number of Students: 5,872
Teacher Education Students: 1,085 undergraduates
460 graduates
Geographic Area Served by
Teacher Education Graduates: South Texas area; an area south of San Antonio to Brownsville, and on a line west to Uvalde and east to Houston

Mission:

Texas A&I University is the most comprehensive and only predominantly residential university in South Texas. It offers a large inventory of academic programs at the bachelor's and master's levels and a doctorate in bilingual education. Its programs in engineering, agriculture, home economics, and adult education are unique to the region. The John E. Conner Museum, Kleberg Hall of Natural History, Caesar Kleberg Wildlife Research Institute, and the Citrus Research Center illustrate unique institutional resources.



Texas A&I University is dedicated to serving an ethnically and culturally diverse student population consistent with its location in South Texas. The University seeks to enhance its position of educational leadership in South Texas by offering programs that attract students from throughout the state and nation, as well as a significant number of international students.

Texas A&I University is committed to providing high quality educational opportunities to all students who demonstrate the potential to benefit from its programs. The University curricula are designed to provide all students with a basic grounding in the arts and sciences. Admission standards balance the University's commitment to open access and rigorous performance standards for successful program completion.

The first commitment of Texas A&I is high-quality teaching. The University encourages research to complement the instructional programs, foster intellectual growth of the faculty, provide a foundation for its graduate programs, and to meet the research-related needs of the region. The University's community service efforts are principally directed toward the technical, developmental, and training needs of agriculture, business, industry, and education. A major effort is devoted to providing life-long learning opportunities to residents of all ages and to serving as a cultural center for the region.

Project 30 Team Members:

Dr. Armando Arias, Dean
College of Arts and Sciences

Dr. Doris Clatanoff, Professor
Department of Language and Literature

Dr. Grace Hopkins, Dean
College of Education

Dr. Manuel Salinas, Chairperson
Department of Education

Dr. Mark Walsh, Director
Continuing Education

Contact Person:
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(512) 595-2802

College Station, Texas 77843
Number of Schools/Colleges: 10
Number of Students: 38,478

Teacher Education Students: 1250 undergraduates
617 graduates
Geographic Area Served by
Teacher Education Graduates: Texas

Mission:
Texas A&M Univeristy is a public institution dedicated to the development and dissemination of knowledge in many and diversified academic and professional fields. The University is committed to assist students in their search for knowledge, to help them understand themselves and their cultural and physical environments, and to develop in them the wisdom and skills needed to assume responsibility in a democratic society. The University assumes as its historic trust the maintenance and enhancement of an intellectual environment that encourages the development and expansion of the human mind and spirit. While continuing to fulfil its mission as a Land-Grant/Sea-Grant/Space-Grant institution, the University is evolving and expanding its role to meet the changing needs of state, national, and international communities. The University aspires to preeminence in teaching, research, and service.

Project 30 Team Members:
Dr. Jane Stallings, Dean
College of Education

Dr. Sylvia Grider, Associate Professor
Anthropology Department

Dr. Paul A. Parrish, Associate Dean
College of Liberal Arts

Dr. William Perry, Associate Provost and Dean of Faculties
College of Science

Dr. William H. Peters, Head
Department of Education Curriculum and Instruction

Dr. Donna Wiseman, Associate Professor
Department of Education

Contact Person:
Dr. Paul A. Parrish
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El Paso, Texas 79968-0569
Number of Schools/Colleges: 7
Number of Students: 17,000
Teacher Education Students: 2,000 undergraduates
650 graduates
Geographic Area Served by
Teacher Education Graduates: Far West Texas and Southern New Mexico

Mission:

To provide quality higher education to the citizens of El Paso and the Far West Texas region, to prepare them to function effectively in society, and to contribute to the quality of life of this community and region.

Project 30 Team Members:

Dr. Bill Cornell, Assistant Dean
College of Science

Dr. Jorge Descamps, Associate Professor
College of Education

Dr. Jon Engelhardt, Dean
College of Education

Dr. Charles Fensch, Chair
Department of Art

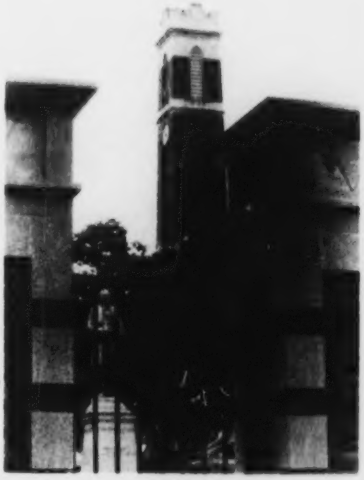
Dr. Carl Jackson, Dean
College of Liberal Arts

Mr. Steve Lacy, Assistant Superintendent
Ysleta Independent School District

Contact Person:

Dr. Jon M. Engelhardt
(915) 747-5572

Nashville, Tennessee 37203
Number of Schools/Colleges: 10
Number of Students: 9,000
Teacher Education Students: 254
Geographic Area Served by
Teacher Education Graduates: Southeast, National, International



Mission:

Vanderbilt's mission is to serve as a comprehensive research university. It is an independent, medium-sized university offering a wide range of undergraduate and graduate/professional programs through its ten colleges and schools. Admission is selective, and there is a heavy research emphasis in the programs and activities of the institution. The University has a faculty of almost 1,400 full-time members and enrolls approximately 9,000 undergraduate and postbaccalaureate students from throughout the Southeast, as well as from a number of areas inside and outside the United States. George Peabody College was an independent institution until it merged with Vanderbilt in 1979 to become Vanderbilt's school of education and human development. Peabody combines a long tradition of teacher eduction with a strong focus on research in education and human development.

Project 30 Team Members:

Dr. Elizabeth Goldman, Associate Professor
Mathematics Education

Dr. Joseph Hamilton, Professor
Landon C. Garland Professor of Physics

Dr. Wendell Holladay, Professor
Physics

Dr. Melvin Joesten, Professor
Chemistry

Dr. Robert Sherwood, Chair
Department of Teaching and Learning and
Associate Professor of Education

Dr. Horace Williams, Professor
Mathematics and Computer Science

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Vassar College

Poughkeepsie, New York 12601-6918
Number of Schools/Colleges: 4 divisions
Number of Students: 2300
Teacher Education Students: 25 undergraduates
0 graduates
Geographic Area Served by
Teacher Education Graduates: National

Mission:

Vassar College is a highly selective, four-year liberal arts college that encourages independence, creativity, and collaboration among its faculty. There is no separate major in Education. Students who wish to become teachers major in an academic discipline and then take a series of courses and field experiences in teacher education. Each year the program graduates about 35 students with state certification.

Project 30 Team Members:

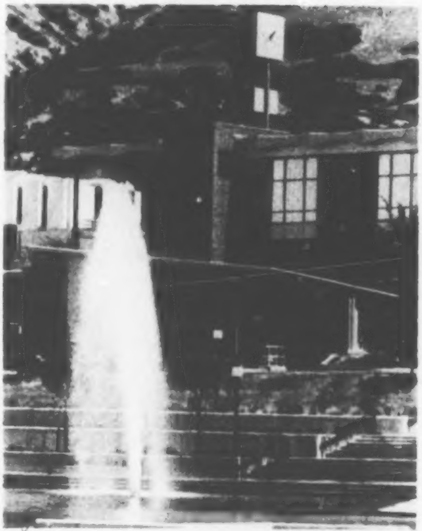
- **Dr. Marianne H. Begemann, Assistant Professor**
  Chemistry Department
- **Dr. Harvey K. Flad, Chairman**
  Department of Geography and Geology
- **Dr. Colton Johnson, Dean**
  Dean of Studies
- **Dr. Thomas McGlinchey, Writing Director**
  Student Support Services
- **Dr. Thomas F. McHugh, Chair**
  Department of Education
- **Dr. Robert B. Suter, Associate Professor**
  Biology Department

Contact Person:

Dr. Thomas F. McHugh
(914) 437-7360

Ogden, Utah 84408-1204
Number of Schools/Colleges: 7
Number of Students: 13,000
Teacher Education Students: 800 undergraduates
200 graduates
Geographic Area Served by
Teacher Education Graduates: Utah

Mission:



Weber State College provides learning opportunities appropriate to a comprehensive institution of higher education, welcoming learners from all regions and nations. The chief mission of the College is to meet the educational needs of Utah through roles assigned by the State Board of Regents in the liberal arts and sciences and a variety of vocations and professions. Primarily committed to quality undergraduate education, the College's selection of degree programs includes some advance professional preparation.

Students are admitted on the basis of demonstrated competence in skills that assure a reasonable chance of success in both college and career. Curricula emphasize further development of such skills, together with acquisition of knowledge and development of character. Eligibility for degrees requires meeting established standards of competence through outcomes assessment.

Instructional programs are designed to prepare students for immediate employment or further study, at the same time equipping them through liberal education for lifelong learning in a changing world. The process of learning is emphasized, as well as acquisition of knowledge. Organized around traditional disciplines, the College also provides opportunities for faculty and students to transcend disciplinary boundaries. Extensive personal contact between faculty and students creates an enriched learning environment both in and out of the classroom.

Weber State responds to the changing Utah environment through public service activities, as well as through conventional and innovative instruction. In order to insure the vitality needed for effective teaching and service, faculty engage in scholarship, research, artistic expression, and other professional pursuits. The College serves as a cultural center for its region and seeks to be a leader in addressing the particular needs of its students, stimulating community economic development, and improving public education.

Project 30 Team Members:

Dr. Helen James, Professor
Department of Chemistry

Dr. Richard Jones, Professor and Dean
School of Education

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Dr. Candadai Seshachari, Professor and Chair
Department of English

Dr. John Ulibarri, Director
Federal Programs for the Ogden School District

Dr. Richard Sadler, Dean
School of Social Sciences and
Professor of History

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Winthrop College

Rock Hill, South Carolina 29733
Number of Schools: 4
Number of Students: 5,388
Teacher Education Students: 750 undergraduates
450 graduates
Geographic Area Served by
Teacher Education Graduates: South Carolina, North Carolina, Georgia and Virginia

Mission:

The college is strongly committed to supporting the academic excellence which is its goal. This is accomplished through competitive student admissions; active fostering of faculty growth and vitality; on-going curriculum examination and development; and providing a conducive learning environment through its laboratories, library, studio and performance spaces, computer laboratories, and other facilities. It is understood at Winthrop that excellence, once attained, is not static but is retained only through continuing effort and commitment.

Project 30 Team Members:

Dr. Marsha S. Bollinger, Assistant Professor
Department of Geology

Dr. James F. Fouche, Dean
School of Education

Dr. Thomas F. Moore, Chair
Department of Chemistry and Physics

Dr. Everett S. Stallings, Associate Professor
Elementary Education

Contact Persons:

Dr. James Fouche and Dr. Robin Bowers
(803) 323-2169

University of Wisconsin-Milwaukee

Milwaukee, Wisconsin 53201
Number of Schools/Colleges: 11
Number of Students: 24,857
Teacher Education Students:
393 undergraduates
345 post-baccalaureate
Geographic Area Served by
Teacher Education Graduates: Milwaukee, Racine, Waukesha, West Allis-West Milwaukee

Mission:

The primary purpose of the University of Wisconsin-Milwaukee is to provide Wisconsin's largest metropolitan area with a major comprehensive doctoral university which offers a comprehensive array of university degree programs, a major program of research that meets the standards of academic excellence, and an expert faculty active in public service. Fulfilling this mission requires the active pursuit of the following mutually reinforcing academic goals:

a. To maintain high quality undergraduate and graduate programs and to develop new programs designed to meet the diversity of needs of the metropolitan, state, national, and international student populations and their communities.
b. To engage in a sustained research effort which will enhance and fulfill the University's role as a doctoral institution of academic and professional excellence.
c. To attract highly qualified undergraduate and graduate students who demonstrate the potential for advanced intellectual development and contributions of leadership and innovation to their communities.
d. To improve academic and professional programming at the undergraduate and graduate levels for part-time, minority, and financially or educationally disadvantaged students.
e. To continue development of high quality doctoral programs in basic disciplines and professional areas.
f. To maintain productive relationships with relevant public and private sector entities at regional, state, national and international levels.
g. To promote public service efforts to help meet the community, governmental, and business needs of the state of Wisconsin and its metropolitan area.
h. To meet the present and future continuing education needs of the public in preparation for the social, cultural, and technological challenges of the 21st century.

Project 30 Team Members:

Dr. Craig A. Berg, Assistant Professor
School of Education

Dr. James R. Coggins, Associate Professor
Biological Sciences

Dr. Richard H. Dittman, Associate Professor
Physics

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Dr. Robert L. Hall, Associate Dean
College of Letters and Science

Dr. William F. Halloran, Dean
College of Letters and Science

Dr. William F. Kean, Associate Professor
Geo-sciences

Dr. Henry S. Kepner, Jr. Professor
Curriculum and Instruction

Dr. Constance J. Moon, Administrative Program Manager
The Center for Math/Science Education Research

Dr. Donald B. Neuman, Professor
Curriculum and Instruction

Dr. Mary Ellen Schaff, Associate Professor
Chemistry

Dr. Philip L. Smith, Associate Dean
School of Education

Dr. William L. Walters, Professor
Physics

Dr. Sam J. Yarger, Dean
School of Education

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